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Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

CHARLES ALFRED WEATHERBY, ALBERT FREDERICK HILL, STUART KIMBALL HARRIS — Associate Editors

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The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Botanical Museum, Oxford St., Cambridge 38, Mass.

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Vol. 49. January, 1947. No. 577.

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Vol. 49. January, 1947. No. 577.

THE GENUS POA IN COOK COUNTY, MINNESOTA*

F. K. Butters and E. C. Abbe

Plates 1051 and 1052

As a result of over twenty years of botanizing in Cook County[1], a considerable number of specimens of the genus *Poa* have accumulated at the Herbarium of the University of Minnesota. A relatively small number of these belong to easily recognized species, but by far the largest share belong to the exceedingly complicated *P. glauca—P. nemoralis* group.

The flora of Cook County, the extreme northeastern county in the state of Minnesota, contains many plants of interesting affinities, some definitely arctic-alpine, some Cordilleran, and some related to the group of species centering about the Gulf of St. Lawrence.[2] In view of this, and of the difficulties that became apparent as soon as we attempted to make a preliminary identification of our material, it seemed worth while to make an intensive study of all the specimens of *Poa* in the Herbarium of the University of Minnesota from this part of the state[3]. As a

* Contributions from the Herbarium of the University of Minnesota, II. Unless otherwise indicated, all specimens cited are in this herbarium.

[1] The botanical exploration of Cook County has been greatly assisted since 1938 by grants-in-aid received from the Graduate School of the University of Minnesota.

[2] Some of these points have been mentioned in passing in earlier papers:

F. K. Butters, Hybrid Woodsias in Minnesota. Amer. Fern Jour. **31**: 15–21. 1941.

F. K. Butters and E. C. Abbe, A New Oxytrope of the Minnesota-Ontario Border. Rhodora **45**: 1–4. 1943.

F. K. Butters, The American variety of Saxifraga Aizoon. Rhodora **46**: 61–69. 1944.

[3] In this study we have been greatly aided by the loan of a considerable suite of specimens from the Gray Herbarium, mainly from northeastern North America, which had been annotated by Professor Lindman after the completion of his monographic

result of this study we have extended the range of several of the races of this group of grasses, have noted one hybrid which seems to be confined to the area in question, and have been constrained to describe one new species.

After the completion of the first draft of this paper and of a flora of Cook County, the writers made an extended trip through Cook County during the summer of 1944 checking the information which had been collected through previous field and herbarium work. Relatively few modifications in taxonomic concepts resulted, other than a strengthening of our conviction that our new species is indeed a natural entity, and the correction and amplification of notes on frequency and habitat of other species.

We frankly acknowledge that in several respects the following treatment is tentative. The inaccessibility of all European types at the present time prevents us from reaching definitive conclusions in several cases. However, it seems worth while to put on record our present findings. For the sake of completeness we have entered in the following key all the species of *Poa* known to us from the county, and have made brief comments on their distribution in the county even when they appear to offer no particular taxonomic difficulties.

Key to the Species of Poa known to grow in Cook Co., Minn.

A. Annual (often a winter-annual). . . . . *P. annua.*
B. Perennials.
  1a. Creeping rhizomes present
    2a. Stem nearly round, culms in bunches. . . . . . *P. pratensis* (sens. lat.).
    2b. Stem flattened, culms not in bunches. . . . . *P. compressa.*
  1b. Creeping rhizomes absent, but the innovations sometimes growing horizontally for a few centimeters and occasionally rooting.
    3a. Lemmas glabrous, including the keel, except for a well-developed web at the base; panicle open, the branches mostly in 2's and 3's. . . . . *P. saltuensis.*
    3b. Lemmas pubescent on the keels and marginal nerves, web at the base variously developed, often very scanty.
      4a. Plants loosely tufted, the innovations mostly extravaginal, often growing out for a few centimeters before they bend upward to form new culms; empty glumes with a green opaque center and white, scarious, translucent margins or frequently more or less suffused with purple which may conceal this pattern (in the latter case the anthocyanin may readily be removed by boiling); end of palea rather acute, the keels converging, covered with crowded, unequal, short teeth.

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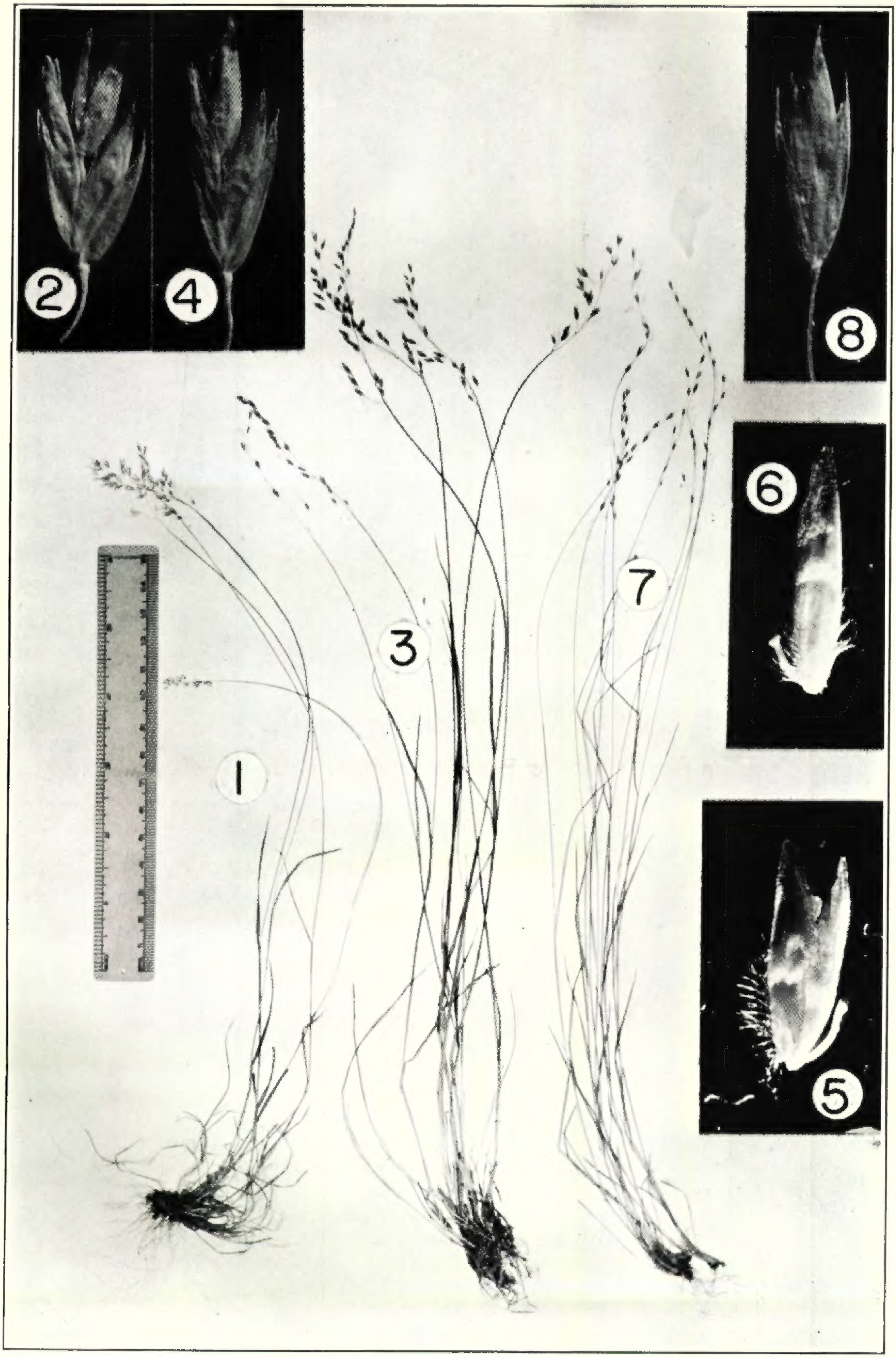
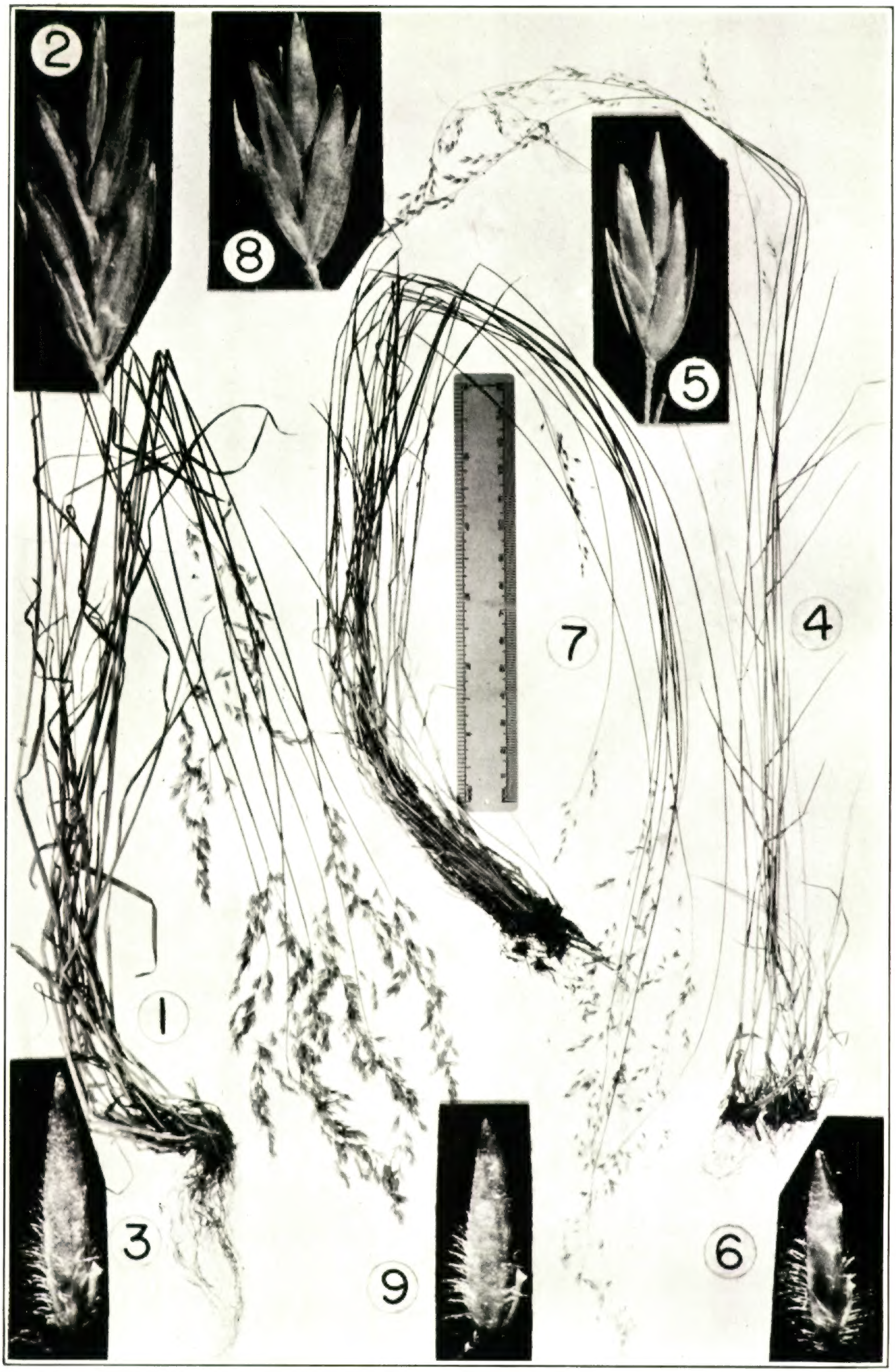
work on this genus in Scandinavia. For this loan we extend our grateful acknowledgment to Professor M. L. Fernald.



Poa scopulorum: figs. 1, 3 and 7, habit, × ⅓; figs. 2, 4 and 8, spikelets, × 6; figs. 5 and 6, florets, × 8.



POA GLAUCA, subsp. GLAUCANTHA: FIG. 1, habit, × 1/3; FIG. 2, spikelet, × 6; FIG. 3, floret, × 8.
P. NEMORALIS, var. INTERIOR: FIG. 4, habit, × 1/3; FIG. 5, spikelet, × 6; FIG. 6, floret, × 8.
× P. TORMENTUOSA: FIG. 7, habit, × 1/3; FIG. 8, spikelet, × 6; FIG. 9, floret, × 8.

5a. Primary culms mostly tall (3 dm. or more), culm with 5(–7) nodes, leafy to above the middle.[4]

6a. Ligule 2–3 mm. long; culms usually stout, often markedly geniculate at the base; panicle usually open and large with abundant tertiary branching and many spikelets; lemmas smooth, neat-looking, tending to be firm, not thin-edged . . . . *P. palustris.*

6b. Ligule less than 2 mm. long, sometimes nearly absent; culms usually slender, curved or geniculate at the base; panicle open and narrowly pyramidal to contracted and spike-like, tertiary branching absent or infrequent and spikelets sometimes very few; lemmas thin-edged and sometimes erose toward the tip, tending to be membranaceous. (*P. nemoralis*, sens. lat.).

7a. Ligule absent or very short (rarely as much as 1 mm. long); empty glumes long (the second as long as the first lemma) and very narrow and straight (awl-shaped), very acuminate (almost bristle-tipped); panicle large (5–25 cm. long), narrowly lanceolate with numerous spikelets and branches, somewhat open at maturity; spikelets predominantly green, occasionally slightly purple and somewhat yellow-tipped; empty glumes with distinct white margins *P. nemoralis* (typical).

7b. Ligule usually 1 mm. or more long; empty glumes shorter and broader than in 7a, short-acuminate to acute, the second rarely equalling the first lemma; panicle smaller than in 7a, open or contracted at maturity, the basal branches mostly 2 or 3.

8a. Spikelets green, rarely with a tinge of purple; glumes with a wide, scarious (usually white) margin and a green center, acute, the lateral nerves evident; habit loose, leaves flat and flexible, ligules very rough *P. nemoralis*, var. *interior.*

8b. Spikelets usually purple; empty glumes with little or no white margin, acuminate; habit rather stiff, leaves flat or conduplicate, not flexible . . . . *P. nemoralis*, var. *montana.*

5b. Primary culms with 3(–4) nodes, the uppermost leaf borne below the middle of the culm[5]. (*P. glauca* sens. lat.).

9a. Plant stiffly erect, mostly under 3 dm. high; culms and cauline leaves stiff, the uppermost leaf 2–5 cm. long; spikelets mostly strongly colored with purple; glumes nearly equal.

10a. Plant mostly 2–3 dm. high; panicle rather loose; spikelets 3–4 mm. long . . . . *P. glauca* (typical).

10b. Plant mostly lower; panicle crowded and almost spike-like; spikelets very dark, about 4–5 mm. long . . . . *P. glauca*, subsp. *conferta.*

[4] For clusters of dwarf secondary culms leafy nearly to the top see footnote 5.

[5] In certain specimens (apparently diseased) of *P. glauca*, subsp. *glaucantha* large tufts of dwarf (1–2 dm.) secondary culms, leafy almost to the inflorescence, arise late in the summer. In the absence of primary culms these might be sought under 5a.

9b. Culms mostly tall (3–8 dm., rarely lower in depauperate individuals), geniculate below and arcuate above; cauline leaves soft; spikelets greenish or only lightly tinged with purple; glumes distinctly unequal.

11a. Cauline leaves mostly 5–8 cm. long and about 2 mm. wide; culms coarse; spikelets (4–) 5–7 mm. long, some of them nearly sessile; plant usually fruiting freely. *P. glauca*, subsp. *glaucantha*.

11b. Cauline leaves mostly 4–6 cm. long, scarcely 1 mm. wide; culms very fine and arcuate; spikelets about 4 mm. long, pedicelled; plant nearly sterile.................. × *P. tormentuosa*.

4b. Plants densely tufted, the innovations intravaginal; empty glumes translucent throughout, without a conspicuously green center, and with no anthocyanin; end of the palea truncate and erose, the keels nearly parallel, pectinate, the chief teeth rather long and widely spaced.................. *P. scopulorum*.

P. ANNUA L. POPLAR LAKE, *Butters and Abbe* 963. Near habitations; introduced weed. Less common in Cook County than in many parts of Minnesota.

P. PRATENSIS L., sens. lat. BRULE RIVER, *Butters & Rosendahl* 4526. Gravelly beach; rare, perhaps native.

While *P. pratensis* sens. lat. is undoubtedly the commonest grass in Minnesota, it is comparatively scarce in Cook County, and is almost entirely confined to obviously disturbed areas (roadsides, camp-grounds, etc.) where it presumably represents a recent introduction. The commonest form, as elsewhere in the state, is var. *angustifolia* (L.) Sm., but the above cited collection is quite unlike this form. The plant is 1.5–3 dm. high, much tufted at the base but with distinct rhizomes; the leaves conduplicate, 2–6 cm. long, the panicles compact, 2–5 cm. long. All parts of the plant contain much anthocyanin pigment. A very similar specimen from Tjust, Småland, Sweden[6] has been annotated "nearest f. *humilis* Ehrh. according to Lindm. [transl.]". Whether our collection from Cook County represents a plant native to the region, or an introduction of a northern European form is impossible to determine. The locality where it was collected was not entirely natural even twenty years ago, and weeds from northern Europe often flourish close to Lake Superior, where the summers are cool and damp. The fact that the plant has been found only in this one locality, a situation not in any

[6] Coll. *C. E. Gustafsson*, June 16, 1918. (in Herb. Univ. of Minn.)

respect peculiar, makes us inclined to accept the second explanation. Unfortunately the place where this collection was made has since been pretty thoroughly destroyed by building operations in connection with a summer resort.

P. PRATENSIS, var. ANGUSTIFOLIA (L.) Sm., Fl. Brit. 105, 1800. PIGEON RIVER, *Butters & Rosendahl* 4623½; GRAND MARAIS, *Butters & Rosendahl* 4664. Roadsides, etc.; infrequent and introduced.

This is the narrow-leaved, narrower-panicled variety with the longer and much narrower basal leaves which has long passed simply as "P. pratensis" among American authors. It appears to be much commoner in this country than is typical *P. pratensis*. We do not agree with Lindman (Bot. Notiser (1926), p. 274) in his treatment of this variety as a species.

P. COMPRESSA L. Between BIRCH LAKE and POPLAR LAKE, *Butters & Abbe* 817; LIMA MOUNTAIN, *Butters & Abbe* 876; GRAND PORTAGE, *Butters & Abbe* 976; Mount Josephine, *Butters & Abbe* 1036 & 1038; GRAND MARAIS, *Butters & Rosendahl* 4654. Roadsides, along trails, rarely in undisturbed places.

This introduced plant is fairly common in Cook County, though probably less so than in the more settled parts of the state.

P. SALTUENSIS Fern. & Wieg., RHODORA **20:** 122. 1918. PIGEON RIVER, *Butters & Rosendahl* 4623; MINERAL CENTER, *Butters & Rosendahl* 4596; CARRIBEAU RIVER, *Butters & Rosendahl* 4492. Moist, shady river-gorges and woodlands; infrequent.

This distinct species occurs sparingly in Cook County and westward as far as St. Louis County. All the collections were made in shady forest, and one each from Cook and St. Louis counties came from groves of hard maple.

P. SALTUENSIS, var. MICROLEPIS Fern. & Wieg., RHODORA **20:** 124. 1918. MINERAL CENTER, *Butters & Rosendahl* 4582.

This collection from a cedar-spruce swamp is the only Minnesota specimen of this variety that we have seen.

P. PALUSTRIS L. *P. serotina* Ehrh. *P. triflora* Gilib.—SEA GULL LAKE, *Butters & Abbe* 915; between MOUNTAIN LAKE and WATAB LAKE, *Butters, Abbe & Abbe* 316; LIMA MOUNTAIN, *Butters & Abbe* 877; GRAND PORTAGE, *Rosendahl* 5981, *F. R. & J. S. Benner* 467; MOUNT JOSEPHINE, *Butters & Abbe* 1034, 1040, 1043,

1046, 1049; Grand Marais, *T. S. Roberts* (no number); 12 miles west of Grand Marais, *Butters & Abbe* 757. Moist roadsides and portage trails, margins of woods.

This species is very common throughout Cook County, as in most parts of Minnesota. It appears to be largely confined to low-lying moist areas, contrasting in this respect with the various forms of *P. nemoralis* and *P. glauca,* which are mostly cliff- and rock-plants.

P. nemoralis L.

An exceedingly polymorphic species. The typical European form has not been seen in Cook County. It is a rare adventive elsewhere in Minnesota. Either this or a very closely allied form occurs, apparently native, in Newfoundland and Labrador but elsewhere in North America it probably occurs only as an introduced plant. The following varieties are well-represented in Cook County, and are undoubtedly native:—

P. nemoralis, var. **interior** (Rydb.) stat. nov. *P. interior* Rydb., Bull. Torrey Bot. Club **32:** 604. 1905. Gunflint Lake, *Butters & Buell* 377; Clearwater Lake, *Butters & Buell* 416, *Butters, Burns & Hendrickson* 6, *Butters & Abbe* 961 A-F; Lima Mountain, *Butters & Abbe* 865, 881; Mountain Lake, *Butters, Abbe & Abbe* 256, 286, 308; *Butters, Burns & Hendrickson* 47, 67, 77; West Pike Lake, *Burns & Hendrickson* 182; John Lake, *Butters & Moore* 10817a; North Fowl Lake, *Butters, Abbe & Burns* 670; Brule River, *Butters & Rosendahl* 4543. Inland cliffs (slate and diabase), hill tops, dry rocks near shore of Lake Superior; common.

Of the several forms of *P. nemoralis* occurring in America this approaches closest to the European f. *vulgaris* with which it agrees in its numerous medium-sized greenish spikelets, having empty glumes with a green center, white scarious border, and usually rather distinct lateral nerves. It is distinguished by the prevailing shorter, broader, and less sharply acuminate empty glumes, its usually less freely branched panicle, and by its ligules, which are about 1 mm. high, and much more visible than in the European counterpart.

Since these differences are either decidedly trivial or wholly intergrading, it seems that it should be considered as a geographical variety rather than a species. Therefore we are adopting Rydberg's specific name in a new combination as no earlier

varietal name seems to be available. Apparently no exactly similar plant occurs in Europe, so that none of the oversupply of European varietal names is applicable. The synonym, *P. caesia* var. *strictior* A. Gray, cited by Hitchcock[7] was originally applied to quite a different grass.[8]

In founding his *P. interior*, Rydberg gave no formal description but referred to a description and plate published by Scribner[9] with the remark "His description and plate illustrates [sic] the American rather than the European plant." Rydberg contrasted the European *P. nemoralis* and his new species as follows: "The European plant is taller, with soft, flaccid leaves, ovate or lanceolate acute ligules, larger spikelets and narrowly lanceolate empty glumes which are tapering gradually at the apex and much narrower than the flowering glumes. The American plant is usually lower and stiffer, has rather firm leaves, truncate ligules, smaller spikelets, broader empty glumes, which are rather abruptly acuminate, and at least the second almost as broad as the flowering glumes." This statement is a curious mixture of a small amount of fact with considerable fiction. As to the supposed differences in habit, both plants are equally variable and the variations largely overlap. Indeed in his last work[10] Rydberg describes *P. nemoralis* as having "stems 3–8 dm. long, slender" and *P. interior* with "stems slender, 3–6 dm. long," the former with "leaf-blades 5–15 cm. long," the latter "2–8 cm. long," not impressive differences, and rendered still less impressive when a casual examination of the many specimens in the Herbarium of the University of Minnesota annotated "P. interior" by Rydberg himself discloses several leaf-blades 10–11 cm. long. One can hardly maintain a variety, still less a species on such differences.

One is amazed and mystified by Rydberg's statement about the ligule of *P. nemoralis*, for that structure, instead of being "ovate or lanceolate, acute," is a narrow band, rarely a half millimeter in width, and with its free edge practically parallel to the base. Moreover all European botanists are united in describing it correctly as very short or even obsolete. What Rydberg was looking at and describing can only be surmised; it certainly was not the

[7] Manual of the Grasses of the United States, p. 933. 1935.
[8] See below, p. 12.
[9] F. Lamson-Scribner, Bull. U. S. Div. Agrost. 17: 250. 1899.
[10] Flora of the Prairies and Plains of Central North America, p. 118. 1932.

ligule of true *P. nemoralis.* The real difference in the ligules of the two forms lies in their size rather than in their shape. Both are equally truncate, but that of var. *interior* is two or three times as high as that of typical *P. nemoralis.*

In respect to the characters of the spikelets, it can first be said that their supposed difference in size is wholly imaginary. European material has spikelets varying from less than 2 mm. long (forma *micrantha* Hn.) to over 6 mm. (forma *Reichenbachii* A. & G. ex Lindm.). The spikelets of var. *interior* fall entirely within these limits and rarely approach either extreme. Second, there is no question that, in general, European specimens of *P. nemoralis* have longer, narrower, and sharper empty glumes than those of var. *interior,* but there is much variation and considerable overlapping in this respect. Occasional undoubtedly native American specimens have the glumes nearly as long and narrow as the European form.[11] A few such specimens have been collected in Cook County. Moreover, on most European specimens of *P. nemoralis* one can find occasional spikelets that are a good match for those of var. *interior.*

In his *Flora of the Prairies and Plains* (page 118–119) Rydberg suggests a difference in the lemmas of the two forms, which, however, proves to be entirely illusory. He says of the lemma of *P. nemoralis* "midrib and laterals sparingly pubescent", and of that of *P. interior,* "scabrous on the midnerve and lateral nerves". An examination of the two side by side shows them to be identical:—both have long silky hairs on the lower half of the mid-rib and lateral nerves, and more or less scabridity on the upper half.

A rather strong tendency in var. *interior* which appears to be hitherto unnoted, is that it most frequently has only two basal branches in the panicle, while European *P. nemoralis* most frequently has higher numbers of basal branches. That it is only a tendency, rather than a diagnostic character may be seen from the following table:—

[11] Apparently Rydberg tried to take care of certain of these cases by erecting another "species", *Poa subtrivialis* (Bull. Torrey Bot. Club **36**: 535. 1909). We have seen no authentic specimens of this. Hitchcock (Man., p. 933. 1935) reduces it outright to synonymy under *P. interior*, and this would appear to be a reasonable disposition of it except for the statement in the original description "floral glumes . . . glabrous". However, for comments on Rydberg's description of the pubescence of lemmas see below in the text.

Number of basal branches	1	2	3	4	5	6	7
Percentage of occurrence							
P. nemoralis (European)	3	26	20	21	25	3	2
P. n. var. *interior*	3	61	20	8	6	2	0

Another tendency is seen in the prevailingly pubescent rachis of the spikelet in European specimens, while in western specimens of var. *interior* the rachis is merely slightly scaberulous. However a few European specimens have the rachis nearly or quite glabrous, and in Minnesota there is a complete series between the two extremes, with this character varying wholly independently of any other.

In his *Manual of the Grasses of the United States* (p. 125. 1935), Hitchcock recognizes *P. interior* as a species, but judging from the range and synonyms given he extends the name to cover the following variety also. As here defined the var. *interior* ranges from the Lake Superior region westward and appears to be quite absent from farther east.

P. NEMORALIS, var. MONTANA Gaud., emend. Lindm., Bot. Notis. (1926): 274. *P. crocata* sensu Rydb., Fl. Pr. & Pl. 119 (1932), in part, perhaps not Michx. Fl. Bor.-Am. **1:** 68 (1803). NORTH LAKE, *Lange* 8; CLEARWATER LAKE, *Butters & Abbe* 72; JOHN LAKE, *Butters & Moore* 10801; NORTH FOWL LAKE, *Butters, Abbe & Burns* 668; MOUNT JOSEPHINE, *Butters & Rosendahl* 6326, *Butters & Abbe* 184; MOUNT MAUD, *Butters & Abbe* 199, 202; CARRIBEAU RIVER, *Butters & Rosendahl* 4481, 4482. Inland cliffs (diabase and slate), dry tops of hills and bluffs both inland and near Lake Superior, river mouths; frequent.

A stiffly upright form, mostly 3–5 dm. high; leaves narrow, mostly conduplicate, ascending at a rather narrow angle, the uppermost borne above the middle of the stem, often quite close to the panicle; ligules 1–1.5 mm. long, nearly or quite glabrous, less truncate than in var. *interior;* panicle sparse and sometimes with very few spikelets, erect or slightly nodding at the top, 3–7 cm. long and rarely as much as 2 cm. wide, the branches ascending and usually closely appressed to the main axis, bearing 2–5 short-pedicelled or sometimes almost sessile spikelets above the middle, simple or rarely with a little branching toward the base of the panicle; the basal branches 2 (in 75 percent of the panicles) or 3 (in 19 percent), rarely 1, very rarely more than 3; spikelets mostly

2–3-flowered, 3–4 mm. long, the empty glumes narrowly lanceolate, sharply acuminate, the second about as long as the first lemma, red-purple sometimes with a narrow whitish border; the lemmas strongly tinged with red-purple and with an orange stripe toward the tip; the whole plant with purple coloration, especially the inflorescence, the exposed nodes (which are almost black), and the basal sheaths.

This variety differs from var. *interior* in its stiffer and lower growth, its slightly different ligules, its somewhat sparser panicles of dark purple spikelets in which the glumes tend to be a little longer and narrower than in var. *interior.* The rachis of the spikelet is usually scabrous-puberulent, but, as noted under the discussion of var. *interior,* some Minnesota specimens of that variety have a puberulent rachis. How much weight should be given to the purple color of the inflorescence is questionable, since it is known in other grasses to be the expression of a relatively simple Mendelian relationship, and furthermore its expression varies considerably with such ecological factors as temperature, moisture, and light. It should be further noted that certain apparently independent characters that have been used to distinguish "species" within this group are but the indirect effects of the presence or absence of anthocyanin. Thus in keying out "*P. nemoralis*", "*P. interior*" and "*P. crocata*", Rydberg uses the following entries[12]:—

"Spikelets green; second glumes with broad scarious margins and strong lateral nerves.
  Second glume narrower than but fully as long as the lemma, acuminate............................16. *P. nemoralis.*
  Second glume fully as wide, but shorter than the lemma, acute..17. *P. interior.*
Spikelets usually purple-tinged; scarious margins of the glumes scarcely evident and the lateral nerves faint......18. *P. crocata.*"

On its face, this key looks fairly impressive, but it should be noted that the purple color occurs in the epidermal cells and thus, if present, suffuses what would otherwise be a broad scarious margin, and also renders the lateral nerves much less obvious. A glume of his no. 18, if boiled to get rid of the anthocyanin, looks just like one of no. 16.

It is with some hesitation that we adopt the name, var. *montana*, for this race of *P. nemoralis.* The name was originally

[12] Flora of the Prairies and Plains, p. 116.

applied to a plant of the Alps, apparently with exceedingly sparse panicles.[13] Lindman emended the concept and extended it to cover a considerable group of Scandinavian plants, and he also applies the name to some Newfoundland specimens. Our Lake Superior specimens are very similar to some of the latter, those called "var. *montana* Gaud." by Lindman.[14] On the average our specimens have slightly smaller spikelets, but there is much overlapping in this respect.

This race undoubtedly comprises a considerable portion of what Rydberg treats as "*Poa crocata* Michx."[15] Whether it includes Michaux's original type is much more doubtful. A photograph of this type is in the Gray Herbarium, and has been carefully examined. It looks much like certain specimens of the race now under consideration, but certain parts of Michaux's description, such as "spiculis omnibus distincte pedicellatis" and "floribus . . . viridibus" do not apply. Piper, who examined the original specimen in 1911, considered it to be *P. triflora* Gilib. [*P. palustris* L.][16] and Hitchcock[17] follows this interpretation, but the photograph looks much more like some form of *P. nemoralis*. This question can be settled only when world conditions allow a re-examination of the type.

P. GLAUCA Vahl, Fl. Dan. fasc. 17, p. 3. 1790. *P. caesia* Sm., Fl. Brit. 103. 1800. *P. caesia* var. *strictior* A. Gray, Man., ed. 5, 629. 1867. MOUNTAIN LAKE, *Butters, Burns & Hendrickson* 47a; PIGEON POINT, *Butters, Abbe & Abbe* 422, 424, *Butters & Abbe* 1009, 1012; CLARK'S BAY, *Butters, Abbe & Abbe* 388, 391; PORCUPINE ISLAND, *Abbe & Abbe* 576; SUSIE ISLAND, *Abbe & Abbe* 568; MOUNT JOSEPHINE, *Butters & Abbe* 1031, 1032, 1037; RESERVATION RIVER, *Butters & Rosendahl* 4567; GRAND MARAIS, *Butters & Rosendahl* 4505; THUNDER BAY DIST., ONT. (Boundary

[13] Ascherson & Graebner, Synopsis der mitteleuropiäschen Flora, 2: 409, say "Rispe nur mit wenigen (meist 5 bis 10) an (bis 2,5 cm.) langen Stielen stehenden Aerchen." Occasionally similar panicles occur in our Lake Superior specimens.

[14] *Fernald, Long & Gilbert* 27410, springy mossy bank, Savage Cove, Straits of Belle Isle, northwestern Newfoundland, July 25, 1925. *Wiegand & Pease* 27413, glades near brook, Bear Cove, Straits of Belle Isle, northwestern Newfoundland, July 25, 1925; *Wiegand, Gilbert & Hotchkiss* 27421, turfy slopes of slaty hills, Little Quirpon, Quirpon Harbor, northwestern Newfoundland. These three specimens in the Gray Herbarium.

[15] Judging from specimens annotated by Rydberg, and also from his citation of "*P. nemoralis* var. *strictior* Gray" (apparently an error for *P. caesia* var. *strictior*) as a synonym, his concept of *P. crocata* included also a considerable element which we are treating as *P. glauca*.

[16] Torreya 13: 35. 1913.

[17] Manual of the Grasses of the United States, p. 935. 1935.

Islands, Pigeon Bay), *Abbe & Abbe* 592a. Rocky shores and shingle beaches of Lake Superior, occasionally on inland cliffs; common.

A considerable number of specimens, nearly all from the shores of Lake Superior are a good match for European material of *P. glauca.* The type material of A. Gray's *P. caesia* var. *strictior* appears to belong here. Gray's original statement is that var. *strictior* is "6–12 inches high [against 6–20 inches for *P. caesia* of Europe] with a contracted grayish purple panicle of smaller flowers." Our Lake Superior specimens range from 6–20 inches (15–50 cm.) high and vary considerably in the size and color of the spikelets, though they always are more or less tinged with purple, sometimes strongly so. Some of them are a very close match for A. Gray's types which were kindly loaned to us by the Gray Herbarium.

P. GLAUCA, subsp. CONFERTA (Blytt) Lindm.[18] LUCILLE ISLAND, *Butters, Abbe & Abbe* 382; GRAND MARAIS, *Wood* 13. Islands, shores and hills adjacent to Lake Superior; infrequent.

Butters, Abbe & Abbe 382, and *Wood* 13 are an excellent match for Newfoundland plants[19] thus determined by Lindman, and correspond well with his description of the Scandinavian plant.

[18] C. A. Lindman, *Poa* in Otto R. Holmberg, Skandinaviens Flora, häfte 2, p. 208. Since this work is at least linguistically somewhat inaccessible, we append a translation of Lindman's description:

"subsp. conferta (Bl.) n. c. P. conferta Bl. Norg. fl. I (1861) p. 123. . . . .

Low to middle high, straw and leaves green, very rarely gray-green but mostly gray-violet to bright red-violet like the leaf blades. Panicle compact. Spikelets large with broad, broadly margined glumes. Culms coarse, somewhat low, usually 2(–3) dm. high, somewhat arcuate, smooth. *Leaves* generally 2, quite broad, the edges often involute, spreading, the uppermost rarely above the middle of the culm; ligule long, even up to 3 mm. broad, and rounded. *Panicle* 3–5 cm. long, compact, cylindrical to narrowly ovate, rarely somewhat open and pointed, dense because of the upright branches and large spikelets. *Spikelets* 3–5 flowered, larger than in the head species. *Glumes* 3–4 mm. long, sometimes reaching the top of the first lemma, the apex grayish or even blackish red-violet. *Outer lemmas* similar with a strong white-hairy line close to the edge, wider and with wider thin margins than in the head species, and with a wider orange-yellow cross-band. ♃ 7.

var. laxiuscula (Bl.) n. c. P. aspera v. laxiuscula Bl. Norg. fl. I (1861) p. 122.—Fig. Fl. D. 2946.

Straw more pliable and slender, sometimes very fine. Cauline leaves often 3, long, narrow, less spreading, the uppermost above the middle of the culm. Ligule about 1 mm. long. Panicle more simple with fewer and finer branches, fewer and smaller spikelets, often spike-like with 1-spikeleted branches. Glumes smaller, relatively straighter and narrower as well as generally lighter violet. Includes some distinguishable forms, which, however, all more or less show approach to *P. nemoralis.*"

[19] *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss* 27408, dry limestone barrens, northern half of Burnt Cape, Pistolet Bay, northwestern Newfoundland, July 17, 1925; *Fernald & Long* 27420, peaty limestone barrens, southern half of Burnt Cape, Pistolet Bay, northwestern Newfoundland, Aug. 5, 1925. These specimens in the Gray Herbarium.

It is separable from typical *P. glauca* by its larger, intensely colored spikelets in narrow, dense panicles, and by the purplish coloration of the whole plant.

P. GLAUCA, subsp. CONFERTA, var. LAXIUSCULA (Blytt) Lindm.[18] MOUNT JOSEPHINE, *Nielsen & Egler* 2051.

This collection is taller and somewhat finer and more leafy than other specimens of subsp. *conferta*. It appears to belong to this variety.

P. GLAUCA Vahl, subsp. GLAUCANTHA (Gaud.) Lindm., Bot. Notis. (1926): 275. WATAB LAKE, *Butters, Abbe & Abbe* 241; CLEARWATER LAKE, *Butters & Wherry* (June 29, 1935), *Butters, Burns & Hendrickson* 123, *Burns & Hendrickson* 156; LITTLE CARIBOU LAKE, *Burns & Hendrickson* 410; ROCKY LAKE, *Burns & Hendrickson* 378; CANOE LAKE, *Burns & Hendrickson* 381; MOUNTAIN LAKE, *Butters, Abbe & Abbe* 258, *Butters, Burns & Hendrickson* 66; MACFARLAND LAKE, *Burns & Hendrickson* 372; SOUTH FOWL LAKE, *Burns & Hendrickson* 282; ROYAL LAKE AND RIVER, *Burns & Hendrickson* 240, 358; PIGEON POINT, *Butters, Abbe & Abbe* 422a, *Abbe & Abbe* 590, *Butters & Abbe* 1007, 1013; LUCILLE ISLAND, *Butters & Abbe* 350; LONG ISLAND, *Abbe & Abbe* 547; SAILBOAT ISLAND, *Abbe & Abbe* 535; MOUNT JOSEPHINE, *Butters & Abbe* 164, 1041. Inland cliffs (diabase and slate); islands, shore rocks and hills adjacent to Lake Superior; common.

This grass appears to be quite common in the region along the Canadian border. Our specimens are an excellent match for certain specimens so determined by Lindman for the region of the Gulf of St. Lawrence[20] and also for a Norwegian specimen[21] determined by Lindman. They are rather coarse and stiff plants 4–8 dm. high, tufted, with culms often markedly geniculate at the lower nodes. The bluish-green leaves are about 2 mm. wide, the uppermost borne far below the middle of the culm. The panicle is profuse, and the spikelets in all the Minnesota specimens are large, (4)5–6(7) mm. long and mostly 3–4(6)-flowered. Some of the spikelets are almost or quite sessile with

[20] *Fernald & Collins* 896, Pointe aux Corbeaux to Cape Caribou, Bic, July 11, 1907; *Fernald & Long* 27423, Savage Cove, Straits of Belle Isle, Aug. 29, 1925; *Fernald, Wiegand, Long, Gilbert & Hotchkiss* 27414, Bard Harbor Hill, July 27, 1925.—All these at the Gray Herbarium.

Some other specimens in the Gray Herbarium similarly annotated as "*Poa glauca* subsp. *glaucantha* fide Lindm." have smaller spikelets, not at all agglomerated, and appear quite different from any Minnesota plants that we have seen.

[21] Otto R. Holmberg, no number, Nordland: Rombaksbotten. 22. VII. 1926,—in the C. E. Gustafsson Collection, Herbarium of the University of Minnesota.

the result that two or three adjacent spikelets may form a glomerule-like cluster.

This entity, originally described as a species, and long regarded as a variety of *P. nemoralis* was shifted into *P. glauca* as a subspecies by Lindman with the comment that he was uncertain whether it was not worthy to be regarded as a species.[22] As it occurs in northeastern Minnesota this grass appears to be quite distinct from typical *P. glauca*, and also from the forms of *P. nemoralis*, although there is evidence that it hybridizes with the latter. It is most abundant on north-facing cliffs along the Border Lakes, but occurs also, somewhat reduced in size, along the shores of Lake Superior. Normal plants in the latter location are about 4 dm. high. A considerable number of even more stunted specimens have been collected there, but they all show signs of fungus infection which seems to have interfered with both their growth and with their fruiting. See PLATE 1052, FIGS. 1–3.

× P. **tormentuosa,** hybr. nov. (*P. glauca*, subsp. *glaucantha* × *P. nemoralis*). Tab. 1052, fig. 7–9. Culmi laxi, tenues ut in *P. nemorali* var. *interiore,* infra medium foliosi ut in *P. glauca* subsp. *glaucantha;* folia ca. 1 mm. lata, ligulis forma, magnitudine pubescentiaque variabilibus; pedunculus paniculae nudus 2–3 dm. longus 0.5 mm. latus; spiculae parvae ut in *P. nemorali* var. *interiore*, 2–3-flores, pedicellatae, 3–4(5) mm. longae, lemmatibus erosis subobtusis ut in *P. glauca* subsp. *glaucantha;* pollen plerumque abortivus; fructus raro gestus.—Typus *Butters, Burns & Hendrickson* 2 in herb. Univ. Minnesota. HUNGRY JACK LAKE, *Burns & Hendrickson* 424; CLEARWATER LAKE, *Butters, Burns & Hendrickson* 2, *Butters & Abbe* 961G; LITTLE CARIBOU LAKE, *Burns & Hendrickson* 410; EAST PIKE LAKE, *Burns & Hendrickson* 233; SOUTH FOWL LAKE, *Burns & Hendrickson* 274, 303; ROYAL RIVER, *Burns & Hendrickson* 336; PIGEON POINT, *Butters & Abbe* 1008, 1010, 1011, 1014. Cliffs (slate and diabase) mostly along the border lakes; occasional.

In working over our Cook County specimens, some dozen were segregated, which agreed remarkably well with one another, but could not be identified with any of the recognized species or varieties. As they combine quite remarkably the characters of *P. glauca*, ssp. *glaucantha* with those of *P. nemoralis*, var. *interior*, and, as they were all collected in a region where both of these

[22] Lindman, C. A. M., Bot. Notiser (1926): 275.

grasses are very common, it occurred to us that they might well be hybrids. This interpretation is strengthened by the fact that the supposed hybrids are largely sterile. Though most of the specimens are thoroughly mature only a very few ripe seeds have been found on them—less than an average of one per plant. Whether these seeds are viable has not been determined, but they appear normal, and they at least suggest the possibility of a few second generation hybrids or back-crosses with one of the parents. The variability of the character of the ligule suggests the same possibility from the genetical standpoint.

In addition to prevalent failure to produce seeds, the pollen of the supposed hybrid has been found to be very poor. Over half of the pollen grains are wholly empty, and the rest are variable in size with numerous dwarf and giant grains. Less than one-fourth of the grains appear reasonably normal under the microscope. In marked contrast to this both of the supposed parents have uniformly good pollen.

The following table presents the characters of the putative parents and the supposed hybrid in parallel columns:—

	P. glauca ssp. *glaucantha*	× *P. tormentuosa*	*P. nemoralis* var. *interior*
Culms	Coarse and stiff Leafy below the middle, the panicle borne on a naked peduncle 2–5 dm. long and ca. 1 mm. thick	Lax and very fine Leafy below the middle, the panicle borne on a naked peduncle 2–3 dm. long and ca. 0.5 mm. thick	Lax and fine Leafy above the middle, the naked peduncle 1–1.5(2) dm. long, and ca. 0.5 mm. thick
Nodes	Covered or slightly exposed	Covered or slightly exposed	Exposed
Leaves	About 2 mm. wide	About 1 mm. wide	1–2 mm. wide
Ligules	1–2 mm. high, narrowed upward, tending to split with age; the back glabrous to slightly scaberulous	Variable, mostly like ssp. *glaucantha;* in one specimen wholly like var. *interior,* in another like var. *interior* in shape but glabrous	About 1 mm. high, truncate; the back ± scabrous-puberulent, usually strongly so
Spikelets	Large, (4) 5–6 (7) mm. long; (2) 3–4 (6)-flowered; some almost sessile	Small, 3–4 (5) mm. long; 2–3-flowered; pedicelled	Small, 3.5–4.5 mm. long; 2–3 (4)-flowered; pedicelled

	P. glauca ssp. *glaucantha*	× *P. tormentuosa*	*P. nemoralis* var. *interior*
Lemmas	Somewhat blunt, erose	Somewhat blunt, erose	Acutish to somewhat rounded, not erose
Pollen	Good	Very poor	Good
Fruiting	Abundant	Very little	Abundant

We have seen specimens of this hybrid only from extreme northern Cook County, a region where both of the parents abound. It is scarcely to be expected far either to the west or to the east of this region, since this appears to be near the eastern limit of one of the parents and the western limit of the other. Doubtless it occurs northward into Ontario since some of our collections come from just south of the border and exactly similar country occurs for some distance northward.

P. **scopulorum** spec. nov. (TAB. 1051, FIG. 1–8) Culmi gracillimi laxi arcuati (17) 30–40 (42) cm. alti laeves vel raro ad paniculam scabriusculi, ad dimidiam foliosi conferti innovationibus normaliter intravaginalibus crebris (surculis rhizomaticis nullis) vaginis basalibus stramineis laxis tenuissimis fragilibus marcescentibus venis persistentibus. Folia culmea 2–4 laxa planiuscula plerumque laevia (raro apicem versus scabriuscula) virentia (3) 5–8 cm. longa (0.5) 1–2 mm. lata ad basin dehinc gradatim angustata ad apicem acuminatum, ligulis 1–2 mm. longis ovatis plus minusve laceris vix decurrentibus glabris. Paniculae 2.7–5.4 cm. longae plus minusve contractae flexiusculae ramis instructae vulgo binis imparibus in nodo singulo ad 1.5 cm. longis adscendentibus vel subpatulis laevibus vel scabriusculis spiculas 1–3 gerentibus. Spiculae ex albo virentes (2.8) 3.5–5.5 (6.0) mm. longae floribus 2–4 glumis acuminatis subaequalibus in carina scabriusculis (raro laevibus) per totum scariis venis obscuris, gluma I anguste lanceolata, gluma II minus angusta valvulam primam aequante; valvulis tenuibus scariis ad apicem rotundatis vel subtruncatis, leviter erosis in dimidia inferiore carinae et triente inferiore nervorum lateralium sericeis in dimidio superiore carinae scabris, inter nervos sparse scabriusculis ad basim araneo minimo instructis; palearum carinis quasi pectinatis dentibus usque ad 70 μ longis vix crebris instructis inter quos dentes breviores sparguntur. Antherae 0.95–1.6 mm. longae flavae oblongae granulis pollenis optimis impletae.

Specimens examined, all from Cook County, MINNESOTA: *Butters & Abbe* 135, gabbro cliffs, Winchell Lake, June 27, 1936;

Butters & Abbe 97, slate and diabase cliffs overlooking Clearwater Lake, June 22, 1936 (TYPE); *Butters & Abbe* 950, upper stable talus at foot of cliff 2B, Clearwater Lake, Aug. 6, 1944 (TOPOTYPE); *Butters & Abbe* 87, first cliff, Clearwater Lake, June 22, 1936; *Butters & Buell* 471, high on cliff south of Clearwater Lake, July 17, 1932; *Butters, Abbe & Abbe* 261, cliff east of portage, south side of Mountain Lake, July 4, 1937; *Butters, Burns & Hendrickson* 56, on cliff, south side of west end of Mountain Lake, July 7, 1938; *Butters & Abbe* 184a, crevices in diabase, top of Mount Josephine, near Grand Portage, June 29, 1936.—Slate, diabase and gabbro cliffs; occasional.

This species appears to belong to the *Poa laxa* group (the section Oreinos sensu Nannfeldt[23]) but in several respects it is more or less aberrant. It does not have the very small anthers (0.6–1.0 mm. long) that are characteristic of all the other species of the group except the Transsylvanian *P. Nyaradyana* Nannf. Neither does it have the keels of the palea as strictly pectinate as in *P. laxa* Haenke or as in *P. Fernaldiana* Nannf. Under a moderate magnification the keels appear pectinate, but under the compound microscope the long teeth are seen to have shorter teeth interspersed between them, not as crowded as in *P. glauca* but more so than in *P. laxa.* On the other hand the Scandinavian representative of the group, *P. flexuosa* J. E. Smith, has the paleal keels almost identical with those of *P. scopulorum* and it is admitted without question by Nannfeldt to the section Oreinos.

The branches of the panicle may be quite as glabrous as is usual in the other species of Oreinos, but they vary from this condition through scattered scabridity to a fairly strongly scabrous condition which is more characteristic of *P. glauca* and its relatives. The ligules of *P. scopulorum* are the shortest described for any species assigned to this section, but they are otherwise quite normal.[24] As a whole the plant is rather larger than plants of the other species of the section.

In contrast to these more or less aberrant features are a considerable number of characters in which it is strictly comparable with the other species of Oreinos. Like all the group it has the culms closely bunched without any tendency to form even the

[23] Symbolae Bot. Upsalienses 5: 1935.

[24] *P. Pattersoni* Vasey of the Rocky Mountains, however, has still shorter ligules. Despite its usually involute, somewhat stiffish leaf-blades it appears to be in all other respects a very normal member of this section, although it was not included here by Nannfeldt.

shortest of runners. The innovations appear to be strictly intravaginal in origin, though this may become somewhat obscured by the later disintegration of the sheaths. The basal sheaths themselves are very thin, loose, and marcescent, eventually disintegrating and leaving only a few strong veins.

The soft, flaccid leaves tapering gradually to a very narrow point are also thoroughly characteristic, as well as the rather long sheaths of the cauline leaves, usually concealing the nodes, but occasionally leaving them slightly exposed.

The spikelets are wholly normal for the group, though practically without any of the purple color found in most species. Both the glumes and the lemmata are very thin and translucent, and their veins are quite obscure. The pubescence of the lemma reaches about as far up the keel and lateral nerves as in *P. laxa*,[25] while the individual hairs are like those of *P. flexuosa* (tapering to an acuminate tip)[26].

The panicle varies somewhat in our different collections. In one (*Butters & Abbe* 87, cf. PL. 1051, FIG. 1) the branches are rather spreading, in all the others (cf. PL. 1051, FIGS. 3 and 7) they are strongly ascending or appressed. As the branches themselves are short this makes less alteration in the appearance of the panicle than would otherwise be the case. Occasionally the branches are solitary, but for the most part they occur in pairs, and then one will commonly bear a single spikelet, and the other either 2 or 3 spikelets.

We have seen eight collections of this plant, all from steep, usually north-facing cliffs of slate, diabase, and in one case gabbro, along the lakes of northern Cook County. Nannfeldt points out that the species of the section Oreinos are essentially alpine rather than arctic. *P. flexuosa* barely gets inside the Arctic Circle in the mountains of Norway. The occurrence of *P. scopulorum* then, in a lowland habitat in latitude 48° N. is quite exceptional, but can be explained by the peculiarities of the habitat. The cliffs on which it occurs are steep enough to give a very fair imitation of alpine conditions: they are too steep for the growth of trees and rise high above the wooded talus at the base; on account of the north exposure they receive scarcely any

[25] Cf. Nannfeldt, loc. cit., p. 46.
[26] Ibid, p. 48.

direct sunlight except for brief periods in the early morning or late afternoon, but have full indirect illumination by sky light at all times; they have perfect drainage; the soil is largely half-disintegrated rock in crevices of the more stable ledges and is often quite unstable; the climate combines extremely severe winters with summers of quite moderate temperatures. Most of the cliffs seem to have been but little interfered with during the Wisconsin glaciation, though there is ample evidence that the whole country was thoroughly glaciated earlier in the Pleistocene.

On the sixth of August, 1944, we re-visited the type locality of *P. scopulorum* with the express purpose of checking on its appearance and distinctness in the field, having previously become familiar with it in the herbarium. We motored over to the west end of Clearwater Lake from our comfortable cottage at Stoltz's on Poplar Lake, rented a canoe from Boostrom's and paddled east on a fine, brisk, sunshiny day past the now familiar shaded cliffs on the south side of Clearwater Lake. The first cliff (cliff 1) we were sorry to see had still far too evident the scars of the fire of August, 1936, and we congratulated each other on having been so fortunate as to have collected over it earlier that summer. Paddling on a mile or so further we passed cliff 2A, nearly overgrown with forest and separated by but a narrow draw from the much larger and more majestic cliff 2B. We drew up in front of cliff 2B and rested on our paddles just long enough to enjoy its magnificence, and to note that there had been several new falls from the crest, so that there were raw gashes in its face and fresh rocks among the lichen-covered boulders forming the high talus rising 200 ft. out of the lake. As usual we experienced some difficulty in finding a good place to draw the canoe ashore, because of the occasional, slippery, half-floating logs along shore, the dense marginal tangle of evergreens, and the boulders so spaced that the moss between them hid fine "booby traps" from ready detection. Gathering together vascula, collecting picks and lunch we began the climb up through the fringe of woods along the bottom of the talus and soon emerged on to the open talus upon which the forest has not as yet encroached. Great blocks of diabase three, four, and five feet on a side, well covered with moss, but often insecurely balanced, form the lower part of

the talus. These grade off into the lichen-covered shards of slate which make the upper part of the talus far easier to descend than to ascend. Finally at the very base of the exposed face of the cliff the talus became finely comminuted slate and distintegrated diabase which has washed down from the cap of the cliff.

First we worked over the upper portion of the talus below the northwest face of the cliff, and found an abundance of *Poa nemoralis*, var. *interior*, none of which matched our conception or description of *P. scopulorum*. However, we faithfully collected from each clone "for the record". Somewhat apprehensively we separated slightly and rounded the talus coming up under the northfacing side of cliff 2B. And "Here it is!" we jubilantly informed each other as we came on either side of a clone of a distinctive fresh blue-green and fully ten feet across. The plants were further along than our type specimens from the same area, and differed in the well-developed basal tufts, but the leaf-blades showed in the field even more strikingly than in the pressed specimens the characteristic laxity of the blade.

We left the cliff finally with the same reluctance we have always felt after a productive and exciting collecting spree on these fine collecting areas, but with a good supply of topotypical material and a feeling of increased confidence in the naturalness of our new species of *Poa*.

This interesting grass adds to the number of species and groups of closely related species that occur in the Lake Superior region and also in the Cordilleras and in the region about the Gulf of St. Lawrence. As in the case of *Oxytropis ixodes* Butters & Abbe[27] this distribution seems to have been of sufficiently long standing to allow complete segregation of species in these areas.

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Explanation of Plates 1051 and 1052

Plate 1051. Poa scopulorum Butters & Abbe. Figs. 1 and 2, from Clearwater Lake, Cook Co., Minnesota, *Butters and Abbe*, no. 87: fig. 1, habit, × ⅓; fig. 2, spikelet, × 6. Figs. 3–6, type, from Clearwater Lake, Cook Co., Minnesota, *Butters and Abbe*, no. 97: fig. 3, habit, × ⅓; fig. 4, spikelet, × 6; figs. 5 and 6, florets, × 8. Figs. 7 and 8, from Winchell Lake, Cook Co., Minnesota, *Butters and Abbe*, no. 135: fig. 7, habit, × ⅓; fig. 8, spikelet, × 6.

Plate 1052. Figs. 1–3, Poa glauca Vahl, subsp. glaucantha (Gaud.) Lindm., from Pike Lake, Cook Co., Minnesota, *Burns and Hendrickson*, no.

[27] Rhodora 45: 2. 1943.

156: FIG. 1, habit, × ⅓; FIG. 2, spikelet, × 6; FIG. 3, floret, × 8. FIGS. 4–6, P. NEMORALIS L., var. INTERIOR (Rydb.) Butters and Abbe, from near Valley City, North Dakota, *H. F. Bergman*, no. 341 (determined by P. A. Rydberg as *P. interior*): FIG. 4, habit, × ⅓; FIG. 5, spikelet, × 6; FIG. 6, floret, × 8. FIGS. 7–9, × P. TORMENTUOSA, hybr. nov. from Clearwater Lake, Cook Co., Minnesota, *Butters, Burns and Hendrickson*, no. 2 (TYPE): FIG. 6, habit, × ⅓; FIG. 8, spikelet, × 6; FIG. 9, floret, × 8.

A NEW FORM OF HELIANTHUS FROM MINNESOTA.—In the Duluth area *Helianthus giganteus* L. is predominantly represented by var. *subtuberosus* (Bourgeau) Britton. It differs from the typical variety in leaf arrangement which is mostly opposite. There occur, not uncommonly, individuals of the variety with at least a single whorl of leaves in threes. Moreover, there occur others in which the leaves of the middle stem are consistently whorled in threes or fours. The form with ternate or quaternate leaves is not restricted to a single locality; its observed range extends through thirty miles from Palmers to Fond du Lac in southern St. Louis Co. The form is herewith described as

HELIANTHUS GIGANTEUS L., var. SUBTUBEROSUS (Bourgeau) Britton, forma **verticillatus,** f. nov., foliis caulinis medianis verticillatis.—MINNESOTA: growing with the variety in a large colony on the east bank of Sucker River, north of the bridge, on the Old North Shore Road near Palmers, St. Louis Co., Aug., 19, 1945, *Lakela* no. 6140 (TYPE in Univ. of Minn. Herb.).

The form differs from the variety in the verticillate arrangement of the leaves of the middle stem. In the type-specimen the leaves are quaternate in six successive nodes of the middle stem. Toward the base of the stem they are opposite and there is a single pair just below the inflorescence. To facilitate pressing, the specimen had to be cut into three parts.

Additional collections were made as follows: Aug. 18, 1946, *Lakela* no. 6693, wooded border of the Old North Shore Road between Sucker and French Rivers; Aug. 28, 1946, *Lakela* no. 6732, wooded roadside, Highway 23, between New Duluth and Fond du Lac, each in southern St. Louis Co.—OLGA LAKELA, State Teachers College, Duluth.

Itea virginica L., forma **abbreviata,** f. nov., foliis reductis 1–2.5 cm. longis 0.5–2 cm. latis; racemis densissimis oblongo-cylindricis 1–2.2 cm. longis 1–1.4 cm. crassis; pedunculis 0.2–1 cm. longis; pedicellis approximatis 1–2 mm. longis; floribus approximatis.—Virginica: peaty and sandy shore of Whitefield's Millpond, southwest of Corinth, Southampton County, June 5, 1946, *M. L. Fernald & H. E. Moore*, no. 15,094 (type in Herb. Gray.; isotype in Herb. Phil. Acad.).

Itea virginica forma *abbreviata* rather strikingly suggests *Fothergilla parvifolia* Kearney but it is, in all technical characters, clearly a very reduced extreme of *Itea*. Although in *Itea virginica* there is considerable variation in length of raceme, the primary or leading racemes are 3–17 cm. long, on often elongate peduncles, and the flowers are sufficiently remote as to leave the rachis and the pedicels clearly evident, while the leaves at flowering time are 3–8 cm. or more long and proportionally broad. The dwarf forma *abbreviata*, on the other hand, has the flowering tips with leaves only 1–2.5 cm. long and 0.5–2 cm. broad, the very short-peduncled racemes so dense that the pedicels and rachis are hidden, the densely compact oblong-cylindric racemes only 1–2.2 cm. long and 1–1.4 cm. thick. Only one shrub was noticed, but at the time of Dr. Moore's and my visit the water of the pond was abnormally high and only a few rods of the bordering and partly submerged thicket were examined, by wading in water well above our knees. The remaining four or more miles of shore will presumably yield other such shrubs.

In his Manual of the Southeastern Flora, 600, Small attempted to clarify matters by adding after the description of *Itea virginica* the explanatory comment: "This shrub often grows intermixed with other shrubs which produce an abundance of racemes of white or pale-pink flowers". Near the outlet of Whitefield's Pond the associated shrubs for the most part do not "produce an abundance of racemes of white or pale-pink flowers": such shrubs as *Salix caroliniana* Michx., *Myrica heterophylla* Raf., *Amelanchier sp.* (with short corymbs of nearly ripe fruit), *Vitis rotundifolia* (with panicles of greenish flowers), *Vaccinium spp.* (with corymbs of mature berries), and a complex series of fruiting shrubs of the *Fraxinus caroliniana* alliance. The only shrubs noted "with an abundance of racemes of white or pale-pink flowers" were typical *Itea virginica, Clethra alnifolia* and *Leuco-*

thoë racemosa. Among these *Itea virginica,* forma *abbreviata* stood out vividly on account of its dense and very white racemes! —M. L. Fernald.

Salicornia europaea L. var. **simplex** (Pursh), comb. nov. *S. herbacea,* β *simplex* Pursh, Fl. Am. Sept. 2 (1814). *S. europaea,* var. *pachystachya* sensu Fernald in Rhodora, ix. 206 (1907), probably *S. herbacea,* β *pachystachya* Koch, Synop. ed. 2: 693 (1844).

Pursh's *Salicornia herbacea,* β *simplex,* "ramis simplicissimis, caule prostrato . . . common along the sea-coast" of northeastern America, is certainly the plant which I intended as *S. europaea,* var. *pachystachya.* It is either prostrate or weakly ascending, with long, tapering, simple spikes 3–10 cm. long and 3–5 mm. thick, these maturing later than the spikes of typical upright *S. europaea.* It closely matches European material sent out as *S. herbacea* var. *pachystachya,* but I have not seen Koch's own material. Even if it is identical with that it must take the first varietal name used for it, so long as it is considered a variety.—M. L. Fernald.

Cornus racemosa in Quebec.—*Cornus racemosa* Lam., which is L'Héritier's *C. paniculata,* was expected to be found in Quebec, since its known distribution reads as follows: Maine to Ontario and Minnesota, south to Georgia and Nebraska.

During August, 1945, while collecting seeds of wild plants for the *Delectus Seminum,* issued annually by the Montreal Botanical Garden, the authors were struck by the curious redness of a shoulder-high bush. This grew in a swale near a small settlement, somewhat reminiscent of John Steinbeck's "Tortilla Flat," known as Brosseau Road, located just across the St. Lawrence River from Montreal and midway between St. Lambert and Laprairie. Its fruits had fallen and the red tint of the shrub itself was ascribed to the remaining pedicels. The latter already have been described by L'Héritier: "*Pedunculi teretes, fructiferi purpurascentes*" (Cornus. Paris. 1788).

Herbarium specimens were secured. The other important specific characters corroborating, this plant proved to be *Cornus racemosa.*

An examination of material in the Marie-Victorin Herbarium of the Institut botanique de l'Université de Montréal shows that this species has previously been collected in Quebec, though as yet not reported in any local flora: Longueuil, Chambly Co., July 18, 1932, *Ernest Rouleau 228.* Same locality, August 20, 1932, *Marie-Victorin & Rolland-Germain 46789.* Lynch Island, Montreal Archipelago, August, 1941, *Bernard Boivin 4401.* Portage-du-Fort, Pontiac Co., banks of the Ottawa River, 3–5 August, 1942, *Marie-Victorin, Rolland-Germain, Ernest Rouleau & James Kucyniak 55078.*

Commuting daily, by bus, from St-Jean, on the Richelieu River, to Montreal, the senior author notes that the plant is of frequent occurrence along the roadside, especially between St-Luc and Laprairie, where it forms an intermittent though dense hedge, "*altitudine humana,*" as L'Héritier stated in referring to its height. In August, 1946, he has also found it to be very common around Vaudreuil, on the Ottawa River, just beyond the westernmost tip of the island of Montreal.

In short, *Cornus racemosa* belongs to a group of southern plants, such as *Allium canadense, Celtis occidentalis, Justicia americana, Menispermum canadense, Panicum virgatum, Rhus Vernix, Verbena simplex, Zanthoxylum americanum,* etc., which have reached Quebec via the Ottawa River, the Richelieu River or the upper St. Lawrence and have Montreal as their northernmost limit.—MARCEL RAYMOND AND JAMES KUCYNIAK, Montreal Botanical Garden.

Volume 48, no. 576, including pages 393–416, i–xv, and title-page of volume, was issued 20 December, 1946.

W. S. White

Rhodora

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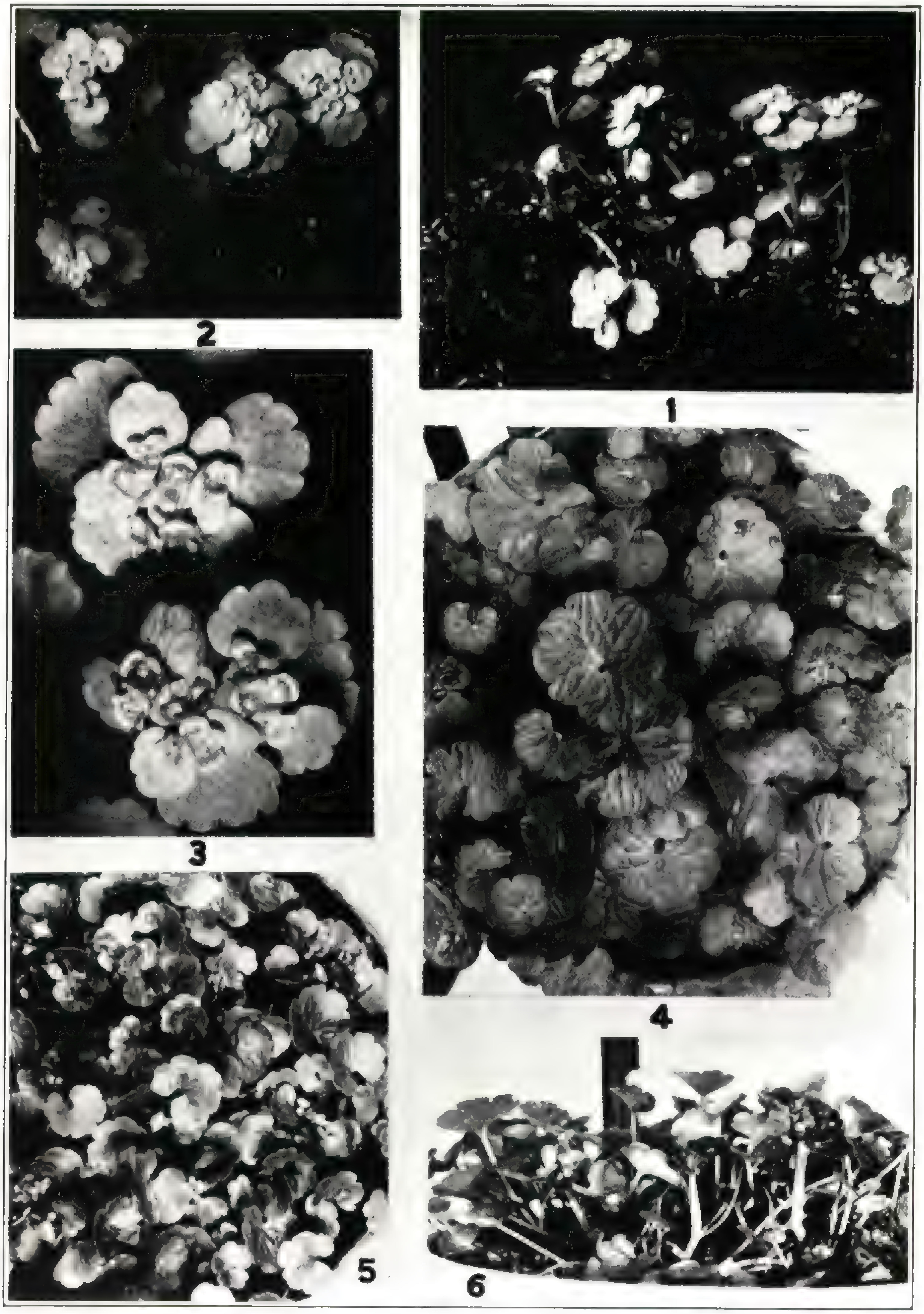

CHRYSOSPLENIUM IOWENSE: FIG. 1, plant, × 2/3, showing stolon-leaves; FIG. 2, plant, × 2/3, from above; FIG. 3, flowering tips, × 1 1/3; FIG. 4, plant, × 2/3 showing nearly closed basal sinus and overlapping basal lobes of leaf.

C. TETRANDRUM: FIG. 5, plant, × 2/3, from above; FIG. 6, plant, × 2/3, from side.

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STUDIES IN CHRYSOSPLENIUM, WITH SPECIAL REFERENCE TO THE TAXONOMIC STATUS AND DISTRIBUTION OF C. IOWENSE*

C. O. Rosendahl

(Plates 1053 and 1054)

Several years ago Professor E. H. Moss of the University of Alberta sent me a number of Canadian *Saxifragaceae* for identification. Among them was a specimen of *Chrysosplenium* (*Moss*, No. 280) which I referred to *C. tetrandrum* Fries. I made note of the fact that the number of stamens was not constant, but varied mostly between 8 and 6. This is one of the characters Rydberg[1] used for distinguishing his *C. iowense* from *C. tetrandrum* which, as the name implies, has only 4. I had not been fully convinced that this was a sufficiently reliable character for maintaining the former as a separate species, especially since a number of botanists dealing with *Chrysosplenium* from the Arctic regions of both the New and the Old World have reported finding plants of *C. tetrandrum* in which the stamens varied in number from 4 to 8. Some of them, particularly Simmons[2] and Heintze[3], have emphasized this feature in support of their arguments that *C. tetrandrum* is only an Arctic variety of *C. alternifolium* L. They contend that such plants constitute a "continuous series" bridging the gap between the two.

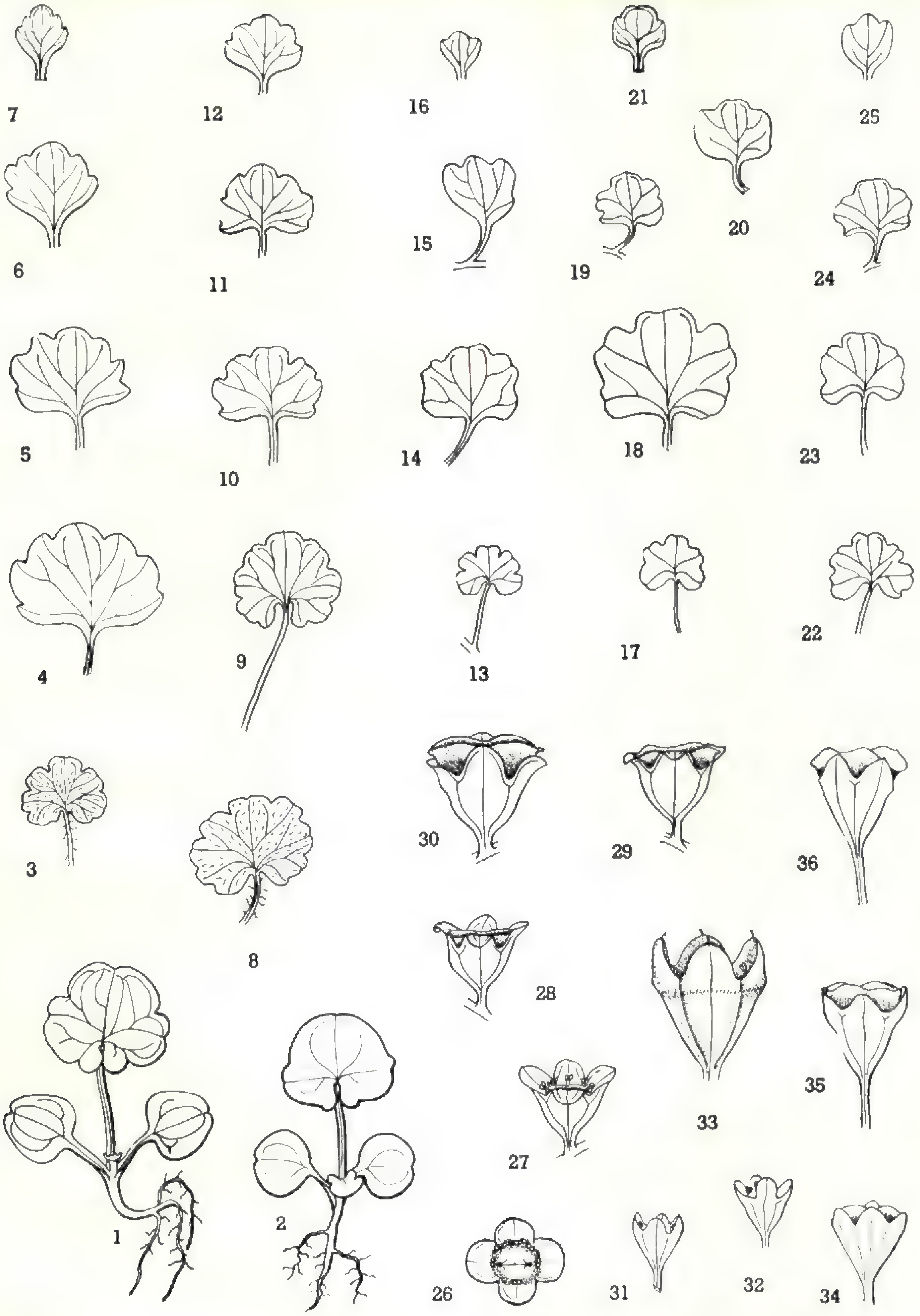
* Contributions from the Herbarium of the University of Minnesota, III.

[1] Britton's Manual, p. 483. 1901.

[2] Simmons, H. G. The Vascular Plants in the Flora of Ellesmereland. Rep. of the Second Norw. Arctic Exped. in the "Fram" 1898–1902. No. 2, p. 59. 1906.

[3] Heintze, Aug. Om *Chrysosplenium alternifolium* L. v. *tetrandrum* Lund och des usbredning inom Skandinavien. Bot. Notiser, p. 231. 1907.

On re-examining the Alberta specimen more thoroughly and comparing it with collections from the type locality in Iowa, I found that it matched the latter not only in the stamen character but in several additional details of flower and fruit structure as well as vegetatively. Although it appeared almost certain that the plant in question could not be anything else than Rydberg's species, yet this meant such a great gap in distribution that I hesitated to commit myself on the basis of only a single specimen. Accordingly I wrote to Professor Moss and asked if perchance he had additional specimens I might see. He kindly responded by sending me five sheets, representing four additional stations, all from within a radius of about 100 miles of Edmonton. All the collections proved to be the same entity and beyond any doubt they belonged with *C. iowense*. However, I was to find out from one of these sheets that the discovery had already been made but apparently left in limbo. The particular sheet is from the herbarium of C. H. Turner and contains two of his collections (No. 471 and 1670) from Fort Saskatchewan, Alberta. It is extensively annotated and the notes are sufficiently illuminating to warrant reproducing in full. The label in the lower right hand corner bears the legend: "Golden Saxifrage, Water Carpet. *Chrysosplenium tetrandrum* Th. Fries. Collector C. H. Turner, No. 471. Wet grounds, Sandhills Ft. Saskatchewan, Alberta June 7, 1935". A line is drawn through the species name and right below it is printed in ink *iowense* Rydb. This name is also crossed out and above both the scratched names is written for a second time *tetrandrum* Fries. There is no signature to show who made these alterations nor is it clear if they were made by one and the same person. It appears likely however, that they are to be attributed to Dr. W. P. Fraser because above the label there is attached a typewritten note by him which reads as follows: "*Chrysosplenium iowense* Rydb. *C. tetrandrum* Fries. Following Rydberg's Key some of our collections fall into this species but from a limited study of the few collections I have made I have grave doubt if it is a good species. It is one of Rydberg's species and as far as I know has not been revised or commented on by any other botanist. It is for you to decide which to use. I'll give more attention to collections but we do not have much of it on the prairies. It is more common in the



DETAILS OF CHRYSOSPLENIUM IOWENSE and C. TETRANDRUM: FIGS. 1, 3–12 and 26–30 C. IOWENSE, FIGS. 2, 13–25 and 31–36 C. TETRANDRUM.

north." The note is dated April, 1940. Above this note there is attached another strip of paper on which is typed "1670 *Chrysosplenium tetrandrum* Fries", underneath which is written, Dr. Hugh M. Raup, Mar. 10, 1941. There are altogether eight plants on the sheet, four of which are numbered 471 and the others 1670. They are all the same entity and I assume that Dr. Raup's identification is meant to apply to both of Turner's collections.

One can readily understand Dr. Fraser's dilemma when one recalls how difficult it often is to get a clear concept of a species from keys and descriptions alone, especially when these are much abridged as they so often are in manuals. Without authentic material at hand the job is sometimes quite baffling and obviously Dr. Fraser had no Iowa plants for comparison. As mentioned above I likewise had been skeptical about the full specific status of *C. iowense* and some forty years ago expressed this doubt by placing it in a lower category, not however under *C. tetrandrum* but as a form of *C. alternifolium*.[4] While this disposition was admittedly erroneous, it expressed nevertheless more nearly its true phylogenetic position.

After a prolonged study of a great deal of material[5] of both *C. iowense* and *C. tetrandrum*, including living plants of both entities, I no longer have any doubt about the former being a distinct species. It differs from *C. tetrandrum* and also from *C. alternifolium* in a number of dependable co-ordinating characters some of which have been entirely neglected, and others the importance of which appears not to have been fully recognized. Before taking these up in detail a brief history of the species is in place.

Chrysosplenium iowense was first collected by Professor E. W. D. Holway in 1888 near Decorah, Iowa. The first published account of it appeared two years later in the sixth edition of Gray's Manual where it was referred to the Old World species *Chrysosplenium alternifolium* L. Its distribution in America was there given

[4] Engler's Bot. Jahrb. 37: Beibl. 83, p. 86. 1905.

[5] In addition to the Canadian material of *C. iowense*, I have had access to practically all known collections of it from Iowa including the type. I have also seen all the sheets of *C. tetrandrum* preserved in the Gray Herbarium, the New York Botanical Garden and the herbarium of the University of Minnesota. I wish to express my appreciation to Dr. Moss, Dr. Fernald, Dr. Gleason and Dr. Hayden for the loan of material.

as "Decorah, Iowa, west to the Rocky Mts. and north through Brit. Am." Seven years later Dr. J. N. Rose[6] published a preliminary revision of the North American species of *Chrysosplenium* wherein he maintained that *C. alternifolium* L. does not occur in America and that American material referred to it belonged instead to *C. tetrandrum* Fries. He furthermore stated that after the study of much material he was forced to restore the latter to specific rank despite the fact that recent monographers had considered it only a variety of *C. alternifolium*. The range of the species was given briefly as "Arctic regions, in America as far south as Colorado". He elaborated upon this short formal statement by adding that in the United States there are only two stations recorded for the species. One of these is in Colorado, where the plant had been collected in 1862 by Hall and Harbour (No. 576) and has not been found since, and the other at Decorah, Iowa, where Prof. E. W. D. Holway had collected it a number of times. He suggested that the plant from the latter place might prove a distinct form since it differed in being somewhat larger, with slightly different leaves and with six or seven stamens. Four years later Dr. Rydberg l. c. segregated the Iowa plant as a distinct species, giving it the name *C. iowensis* and pointed out that it had been "confused with *C. alternifolium* L. with dull punctate leaves with truncate lobes and *C. tetrandrum* Fries with thick 3–5-lobed leaves and 4 stamens". In his treatment of the *Saxifragaceae* in the North American Flora (Vol. **22:** Part 2, 83. 1905) Dr. Rydberg corrected the gender of the epithet to *iowense*. The same year appeared my paper on the North American *Saxifragaceae* l. c. where I committed the before-mentioned blunder of treating it as a *form* of *C. alternifolium*. Finally in the seventh edition of Gray's Manual it is referred without any qualifying comments to *C. tetrandrum* Fries and therefore presumably held to be conspecific with the latter.

It is understandable that the independent status of *C. iowense* should have been questioned at the time considering how exceedingly little material was available and how little was actually known about it. Dr. Rydberg had only the two plants of the original collection before him when he drew up his description and these either did not reveal or else he failed to recognize as of

[6] Bot. Gaz. **23**: 274–276. 1897.

diagnostic importance a number of additional stable characters which distinguish it from *C. tetrandrum*. The situation was not improved by his treatment in the North American Flora l. c. for there, except for the two characters he used in the key, i. e. difference in the number of stamens and lobes of the leaves, the descriptions read so much alike that one would be justified in questioning whether the two were really distinct entities. There is however no lack of differentiating characters and it seems strange that such obvious differences in flowers and leaves as are clearly shown in the accompanying photographs (Plate 1053) were not made use of. As early as the seedling stage differences between the species are manifest (Plate 1054, figs. 1, 2). By the time the plants have attained the flowering stage the contrast between them is so marked that mere outward appearance suffices to set them apart as well defined species (Plate 1053, figs. 1–6). In my experiments with growing the plants I find that *C. tetrandrum* produces flowers and matures seed in one season (3–4 months). During the period of active growth several leafy stolons are produced in the axils of the radical leaves. *C. iowense* on the other hand does not develop flowering stems the first season but produces instead a number of radical leaves and stolons. If the latter continue to grow at or close below the surface of the ground they bear a variable number of ordinary green leaves, but when they penetrate deeper their leaves are reduced to the sheathing colorless portion of the petiole and a rudimentary lamina. That the plant behaves the same in nature is indicated by the fact that in all herbarium specimens where I could make out the connection each flowering stem was found to arise from the end of a stolon of the previous season. The radical and stolon-leaves are orbicular-reniform, 7–11-lobed, with a narrow or closed basal sinus due to the overlapping of the basal lobes (Plate 1053, fig. 4; Plate 1054, figs. 3, 8). The blades are rather thin and impressed-veined above and either glabrous or sparingly pubescent on the upper surface; the stolon-leaves are pubescent (Plate 1053, figs. 1, 4; Plate 1054, figs. 3, 8) with erect white hairs on both surfaces, those on the lower side are shorter and less numerous; the lowermost cauline leaf is round-reniform to reniform (Plate 1054, fig. 9), 7–9-lobed and glabrous; the succeeding cauline leaves are flabellate, 6–7-lobed and glabrous

(Plate 1054, figs. 4, 5, 6, 10, 11), the two uppermost are adnate by their petioles to the branches of the dichasial cyme and stand immediately underneath the inflorescence (Plate 1053, figs. 1, 2, 3). The bracts are mostly broadly obovate, 3–5-lobed (Plate 1054, fig. 7), rarely 6-lobed, and lemon-yellow in color at anthesis.

In *C. tetrandrum* the radical and stolon-leaves are reniform, 5–7-lobed, with a rather open basal sinus (Plate 1053, fig. 5; Plate 1054, figs. 13, 17, 22), thick and glabrous except for a sparse pubescence of crinkly hairs on the petioles, sometimes a few of these hairs extend up on the edges of the basal lobes and very rarely stolon-leaves are found with a few hairs on the surface of the lamina toward the base. The lower and middle cauline leaves are subreniform or often with a truncate base and nearly parallel sides (Plate 1054, figs. 14, 18, 23), 5-lobed and glabrous; the two uppermost are irregularly 4–5-lobed, somewhat variable in shape (Plate 1054, figs. 15, 19, 20, 24), and with less regular adnation of their petioles to the cyme-branches. The bracts are obovate, mostly with broadly cuneate base, and 3-lobed to entire (Plate 1054, figs. 16, 21, 25).

The flowers in *C. iowense* are bright golden-yellow, short-campanulate (Plate 1054, fig. 27) and 3.5–4.5 mm. broad at anthesis; the sepals are spreading, with recurved tips (Plate 1053, figs. 2, 3), those of the outer cycle considerably broader than long and obtuse at the apex, the two of the inner cycle somewhat narrower and less bluntly rounded (Plate 1054, fig. 26), all more or less distinctly 3-nerved; disk narrow, stamens 8–5, mostly 7–6, 0.6–0.7 mm. long, styles 0.3–0.4 mm. long; mature fruit campanulate (Plate 1054, figs. 29, 30), the mouth of the dehiscing capsule even with or slightly exceeded by the sepals; the seeds are ellipsoid, 0.7–0.8 mm. long and dark reddish-brown when fully mature.

The flowers of *C. tetrandrum* are green or rarely faintly yellow-tinged, often spotted with anthocyanin, turbinate (Plate 1054, figs. 31, 32, 33), 2–2.5 mm. broad at anthesis; sepals erect, convexo-concave, with the margins and rounded tips incurved (Plate 1053, fig. 5, Plate 1054, fig. 33), all four of nearly equal size, obscurely 1-nerved, the lateral nerves either lacking or showing faint traces near the base only; disk obsolete; stamens 4, rarely 3, 0.3–0.4 mm. long; styles 0.2–0.25 mm. long; mature

fruit trumpet-shaped, the flaring mouth of the capsule overtopping the sepals (Plate 1054, fig. 36); seeds ovoid, 0.6–0.7 mm. long, bright chestnut-brown.

The principal distinguishing differences may be summarized as follows:

Flowers short-campanulate, 3.5–4.5 mm. broad at anthesis: sepals bright yellow, spreading, with recurved tips, the two outer noticeably broader and blunter than the two inner and clearly 3-nerved; stamens 8–5, mostly 7–6, 0.6–0.7 mm. long, filaments about twice as long as the anthers; seeds dark reddish-brown; radical and stolon-leaves orbicular-reniform, 7–11-lobed, stolon-leaves pubescent on both surfaces, upper and middle cauline leaves flabellate, mostly 6–7-lobed, bracts bright yellow . . . . *C. iowense*

Flowers turbinate, 2–2.5 mm. broad at anthesis; sepals green, sometimes faintly tinged with yellow, often with purplish spots, erect with incurved sides and tips (convexo-concave), all four of nearly equal size, obscurely 1-nerved; stamens 4, 0.3–0.4 mm. long, filaments shorter than the anthers; seeds bright chestnut-colored; radical and stolon-leaves reniform, 5–7-lobed, glabrous, except for sparse pubescence on petioles, upper and middle cauline leaves from broadly obovate to subreniform, more or less irregularly 3–5-lobed, bracts green . . . . . *C. tetrandrum*

Although, as already suggested, *C. iowense* stands closer phylogenetically to *C. alternifolium* than to *C. tetrandrum*, it is nevertheless amply distinct from the common Old World species. One of the characters which both Rose, l. c., and Rydberg, l. c., regarded as diagnostic for *C. alternifolium* is the spotted or dotted nature of the leaves and sepals. These dots are due to the presence of internal tannin cells which occur either singly, or more often, in smaller or larger groups. In occasional herbarium specimens they are not very obvious, but by treating with ferric chloride they turn black and stand out conspicuously. I have not found any specimens of *C. alternifolium* from its entire range in Europe in which these tannin cells are lacking. In striking contrast they are entirely absent in all the material of both *C. iowense* and *C. tetrandrum* which I have studied. In the original description of *C. tetrandrum* Fries[7] described the sepals and also the carpels as being brown-dotted. In many specimens of the species, especially from the far north, the sepals, carpels and sometimes the bracts and leaves also are spotted, but here the spots are due to the presence of anthocyanin in small patches of epidermal cells and they are reddish or purplish instead of brown.

[7] Fries, Th. M. Bot. Notiser. p. 193. 1858.

They disappear completely by boiling or merely soaking in water, whereas the dots in *C. alternifolium* are a permanent feature, unaffected by boiling or treating with alcohol. When, in addition to a fundamental and unmistakable anatomical character of this kind, there are a number of stable correlating characters of flower[8] and foliage which set off *C. alternifolium* sharply from *C. tetrandrum*, it is difficult to understand why the latter has come to be regarded by many as a mere variant of the former. In raising it to specific rank, Fries, l. c., showed a better understanding of the plant than did either Maximowicz[9] or Franchet[10], the two chief monographers of the genus, and those who have followed them in treating it only as a variety. Fries knew the two entities in the field and he remarked that when he first encountered *C. tetrandrum* on a journey in Finmarken after having observed *C. alternifolium* in "full splendor" all the way through Guuldalen, he was impressed by their marked dissimilarity. He moreover emphasized that they had entirely different geographical distributions.[11]

The persistence, especially of European systematists (Hegi, Mittel Eur. Flora **4:** 2, 635; Engler & Prantl, Ed. 2, **18a,** 164. 1930) in treating *C. tetrandrum* as only a variety is no doubt largely due to Simmons', l. c., categorical statement that if sufficient material is examined the "arctic and temperate forms will be seen to be continually connected by intermediate forms". His principal argument for this dictum is the occurrence in the Arctic of plants with stamens varying in number from 4–8. He further sought to strengthen the case by maintaining that there are intermediates in respect to stature and shape of leaves. Size of plants is altogether too variable in either species to be of any significance and leaf-form is of lesser importance unless strictly corresponding leaves are compared.

8 The flowers of *C. alternifolium* are short-campanulate, 5–6 mm. broad at anthesis; the sepals are golden yellow, spreading, recurved at the tips and 3-nerved; there is a broad nectariferous disk, regularly 8 stamens which are more than twice as long as in *C. tetrandrum*, and the styles are fully three times as long. The radicle leaves are orbicular to orbicular-reniform, 11–16-lobed (most commonly 13). The lobes are truncate or more or less deeply emarginate, with nearly straight parallel sides, giving them a rectangular to broadly cuneate shape; the thin blades are conspicuously pubescent on both surfaces.

9 Maximowicz, A. J. Melanges Biol. IX: 762. 1876.

10 Franchet, M. A. Nouvelle Archives d'hist. Nat. 3 Ser. II, 1890.

11 The northernmost recorded station for *C. alternifolium* is at Overhalden, Norway, Lat. 64° 30′ N., while the southernmost occurrence of *C. tetrandrum* in Europe is around Lat 67° 30′ N. in Sweden.

I have searched assiduously for these purported intermediates and I am unable to find any. The scores of plants of *C. tetrandrum* which I have raised from seeds from several collections made by Miss Oldenburg in the American Arctic are remarkably uniform as regards both the vegetative and reproductive tracts. I have not encountered a single individual which shows any degree of variation either toward *C. alternifolium* or *C. iowense.* The same is equally true of all the herbarium material I have studied. The plants Simmons and others have mistakenly held to be intermediate forms prove instead to be another and distinct entity, which on no other character than the variable number of stamens can be claimed to be intermediate. This entity, with prevailingly 6–7 stamens is in my opinion *C. iowense.* As long as the latter appeared to be restricted in its distribution to a limited area in northeastern Iowa, this assertion might well be open to serious question, but as already shown, it is not so limited in its range. Not only does it occur in a number of places in Alberta, but it also appears to be widely distributed in the Arctic. I have one collection made by Miss Oldenburg at Cambridge Bay, Victoria Island, which in flower, fruit and seed characters matches *C. iowense* completely. Only in its smaller size (3–6 cm.) and smaller, somewhat fleshier leaves does it differ from specimens from Iowa. I would also refer to the same species a collection by Ralph Robinson (No. 42) from Cairn Lake, Baffin Island. It is a moldy and poorly preserved specimen, but it has the open larger flowers with more than 4 stamens characteristic of the species.

In Gröntved's[12] paper on the Vascular Plants of Arctic North America there are listed several collections of *Chrysosplenium,* three of which are reported to have 6 or 7 stamens. While I have not had access to these specimens, I am of the opinion that they are not *C. tetrandrum* but low Arctic forms of *C. iowense.* From the Old World Arctic I have seen two collections which I believe belong with the latter also. One is from the Island of Vaigach by Otto Ekstam, the other from near the mouth of the Yenisei (Lat. 72° 25′ N., Long. 80° 35′ E.) by N. J. Kusnezow and W. W. Reverdatto. Both collections are identified as *C. alternifolium* which they clearly are not. They lack the charac-

[12] Gröntved, Johs., Report of the Fifth Thule Expedition 1921–24 Vol. II, No. 1 p. 47–48

teristic tannin cell dots and they have glabrous radical and cauline leaves. Some of the flowers have 8 stamens and these as well as the styles are of the same length as in *C. iowense.* The Ekstam specimen has the ellipsoid, dark reddish brown seeds and pubescent stolon-leaves characteristic of the latter. In presenting evidence for retaining the varietal status of *C. tetrandrum*, Heintze, l. c., reported finding plants at Saarikoski, Torne Lapmark, in 1904 with "stems up to 1 dm. high, very succulent, lower leaves pubescent, of the size of the head species, occasional flowers with 8 stamens". Three years later he described in detail plants from the same locality, stating that the lowermost stem-leaves were glabrous or sparsely hairy and the stolon-leaves were always pubescent, with the hairs distributed evenly and richly over the surface. The stamens were reported as 4 or seldom 3. I am inclined to doubt if Heintze was dealing with strictly one entity, for I have never yet found such a combination of characters in *C. tetrandrum* as he records. His failure to make any mention whatever of the basic differences in the shape of the flower of the two entities is also a little suspicious.

While it is obviously not safe on the present evidence to assert that *C. iowense* or a variant of it occurs in the Old World Arctic, it is certain that a form occurs there which is neither *C. alternifolium* nor *C. tetrandrum* and that this form does agree in floral and vegetative characters with *C. iowense* as it occurs in the American Arctic. Possibly this form should be treated as an arctic variety but the study of more material needs first to be made.

The isolated occurrence of the species in northeastern Iowa presents a striking case of disjunct distribution and another instance of a Pleistocene relic holding out in or on the edges of the Driftless Area. It is mostly limited to cold-water seepage places on north-facing wooded bluffs. At Brainard in Fayette County it grows at the entrance to an ice cave and in Pine Hollow, Dubuque County, at the entrance to a cool cave. The type locality has been given as Decorah but this is an error. The actual site is in the Canoe Creek Valley, six miles due north of Decorah.

In citing specimens the following abbreviations have been used: G., Gray Herbarium; I. S. C., Iowa State College; M.,

University of Minnesota; N. Y., New York Botanical Garden; U. A., University of Alberta; U. I., University of Iowa.

The following specimens of *C. iowense* have been examined: Iowa: Sect. 8, Canoe Twp., Winneshiek Co., in moss, July 1, 1888 (G., type), May 5, 1889 (I. S. C.), May 1893 (I. S. C.), *E. W. D. Holway;* same station, May 31, 1889 (M.), May 17, 1900 (M.), June 10, 1900 (M.), *A. F. Kovarik;* same station, Aug. 4, 1919 (M.), *C. O. Rosendahl* Nos. 3852, 3853; Decorah, May 5 and June 16, 1899 (I. S. C.), *Herbert Goddard;* Sect. 6, Decorah Twp., May 17, 1933 (I. S. C.), May 28, 1934 (I. S. C.), *W. L. Tolstead;* same station, growing in Mnium moss on moist talus, May 15, 1946 (M.), *C. O. Rosendahl* No. 7763; same station, May 29, 1946 (M.), *Rosendahl, Moore* and *Huff* No. 7764; entrance to ice cave, Brainard, Pleasant Valley Twp., Fayette Co., June 10, 1899 (M., I. S. C.), *A. F. Kovarik;* Pine Hollow State Park, Sect. 6, Liberty Twp., Dubuque Co., June 16, 1940 (I. S. C.), *Ada Hayden* No. 9902; same station, growing on rocks at mouth of cold cave, June 27, 1946 (M.), *Dietz, Barret* and *Young;* wooded bluff oposite Old Stone House, Allamakee Co., June 24, 1929 (U. I.), *B. Shimek.* Alberta: Elbow River, Rocky Mts., Lat. 49° 40′, June and July 1897 (G., N. Y.), *John Macoun* No. 20168; forest edge, 100 miles N. of Edmonton, May 15, 1915 (U. A.), *C. H. Turner;* east of Edmonton, May 25, 1919 (U. A.), *W. C. McCalla* No. 2665; wet places, poplar spruce grove, near Edmonton, May 26, 1926 (U. A., M.), *E. H. Moss* No. 280; near Edmonton, June 7, 1926 (U. A.), *E. H. Moss* No. 365; wet Sphagnum bog, fed by iron spring, north of McLeod Valley, about 120 miles west of Edmonton, July 21, 1945 (M.), *E. H. Moss* No. 6821; damp mossy ground under willows, near Peers, about 120 miles west of Edmonton, July 24, 1945 (M.), *E. H. Moss* No. 6864; Fort Saskatchewan, June 7, 1935 (U. A.), *C. H. Turner* No. 471; Sand Hills, 8 miles N. E. of Fort Saskatchewan, May 27, 1940 (U. A.), *C. H. Turner* No. 1670; low, wet forest trail, 9-mile point, Slave Lake District, May 31, 1929 (N. Y.), *A. H. Brinkman.* District of Franklin: wet drainage valley, Cambridge Bay, Victoria Island, Aug. 18, 1944 (M.), *Margaret E. Oldenburg* No. 921; shore, Cairn Lake, Baffin Island (G.), July 28–30, 1922, *Ralph Robinson* No. 42.

Explanation of Plate 1053

Fig. 1, Chrysosplenium iowense, in natural habitat, near Decorah, Iowa. The pubescent stolon-leaves can be seen at the right, × ⅔; fig. 2, the same, photographed from above, showing the wide open flowers with recurved sepal-tips, × ⅔; fig. 3, the same enlarged to 1⅓ natural size; fig. 4, *C. iowense*, plants grown from seed collected west of Edmonton, Alberta; note the orbicular-reniform leaves with overlapping basal lobes and nearly closed basal sinus; the pubescent stolon-leaves shown clearly near upper right hand corner, × ⅔.

Fig. 5. C. tetrandrum, plants grown from seed collected in the American Arctic; note the glabrous radical and stolon-leaves with open basal sinus; some of the flowers in anthesis showing the incurved sepal-tips; near the upper left-hand corner two partially developed fruits, × ⅔. Fig. 6, the same, photographed from the side, showing several flowers in anthesis, the short stems elongating somewhat after flowering, × ⅔.

Explanation of Plate 1054

Figures 1, 2 and 33 are from living material, all the rest from herbarium specimens.

Fig. 1, seedling, of C. iowense, grown from seed collected west of Edmonton, × 3; fig. 2, seedling of C. tetrandrum, grown from seed collected in the American Arctic, × 3; both seedlings at same stage of development.

Figures 3–7 incl. are of C. iowense from the type-locality: fig. 3, stolon-leaf, × 1⅓; fig. 4, middle cauline leaf, × 1⅓; figs. 5 and 6, the two uppermost cauline leaves × 1⅓; fig. 7, one of the secondary bracts × 1⅓.

Figures 8–12 incl. are of C. iowense from Alberta: fig. 8, stolon-leaf, × 1⅓ (*Turner* No. 471); fig. 9, radical leaf, × 1⅓ (*McCalla* No. 2665); fig. 10, middle cauline leaf, × 1⅓ (*Turner* No. 471); figs. 11 and 12, the two uppermost cauline leaves × 1⅓ (*Turner* No. 471).

Figures 13–16 incl. are of C. tetrandrum from Finland (*Justus Montell*): fig. 13, radical leaf, × 1⅓; fig. 14, cauline leaf, × 1⅓; fig. 15, one of the two uppermost cauline leaves, × 1⅓; fig. 16, one of the upper bracts, × 1⅓.

Figures 17–25 incl. are of C. tetrandrum, mostly from collections from the American Arctic: fig. 17, radical leaf, × 1⅓ (*Butters*, Lake O'Hara, B. C.); fig. 18, lower cauline leaf, × 1⅓ (*Oldenburg* No. 162); fig. 19, one of the upper cauline leaves, × 1⅓ (*Butters*, Lake O'Hara, B. C.); fig. 20, one of the uppermost cauline leaves, × 1⅓ (*Hall & Harbour* No. 576); fig. 21, one of the primary bracts, × 1⅓ (*Oldenburg* No. 162); fig. 22, radical leaf, × 1⅓ (*Abbe* No. 3555); fig. 23, middle cauline leaf, × 1⅓ (*Abbe* No. 3555); fig. 24, one of the uppermost cauline leaves, × 1⅓ (*Abbe* No. 3555); fig. 25, secondary bract, × 1⅓ (*Oldenburg* No. 162).

Figures 26–30 incl. are of flowers and fruits of C. iowense: fig. 26, flower in late anthesis, × 2½ (*Moss* No. 280, Alberta); fig. 27, early stage of fruit development, × 2½ (*A. F. Kovarik*, Decorah); fig. 28, fruit, more advanced stage, × 2½ (*A. F. Kovarik*, Decorah); fig. 29, mature fruit, × 2½ (*A. F. Kovarik*, Decorah); fig. 30, mature fruit, × 2½ (*Moss* No. 365, Alberta).

Figures 31–36 incl. are of flowers and fruits of C. tetrandrum: fig. 31, flower in anthesis, × 2.6 (*Oldenburg* No. 86); fig. 32, flower in late anthesis, × 2.6 (*Oldenburg* No. 86); fig. 33, flower in anthesis, × 5 (living material); fig. 34, early fruiting stage, × 3 (*Oldenburg* No. 86); fig. 35, nearly mature fruit, × 3 (*Oldenburg* No. 86); fig. 36, mature fruit, × 3 (*F. K. Butters*, B C.).

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STUDYING WILLOWS OR MAKING NEW SECTIONS IN THE GENUS SALIX

Carleton R. Ball

Recently, Fernald (Rhodora **48:** 44. 1946) has published two new sections (Uva-ursi and Argyrocarpae) in the genus *Salix*. The recognized right to publish entails responsibility for adequate information, which seems not to have been met. The equal right of discussion, and of criticism where warranted, also entails responsibilities, herein recognized. Three points should be considered in appraising the discussion.

1. Each of the two new sections contains but a single species. There are several other species in each of the two earlier sections to which these now-segregated species customarily have been assigned. In transferring a species from a plural-species section to become the type of a new 1-species section, there is obligation to show its relationship to all the species of the earlier section and not merely to the type thereof. The description and inclusiveness of a plural-species section always must be broader than those of its type species, just as the description of a plural-species genus always must be broader than that of its type species.

2. There are some 125 species of *Salix* in North America, and several hundreds in the world. Is each of them to become the type of a new section, without comparison with any except the type species of the earlier section (as in the case of *Uva-ursi*) or without any comparison whatever (as in the case of *Argyrocarpae*)? To exclude all other species from a new 1-species section because they differ from its type is no more logical than excluding new species from a genus because they differ from its type species.

3. In announcing conclusions about sections or species of a genus which is widely distributed on five continents, it seems desirable, even necessary, to consider species outside of any particular manual range. For example, the nearest relative of the writer's *S. Setchelliana*, from Alaska and Yukon, is found in the Carpathian Mtns. of southeastern Europe.

New Section Uva-ursi Fernald

This new section, based on *S. uva-ursi* exclusively, was described by Fernald as differing from *S. herbacea* L., the type

species of section *Herbaceae* Borrer, in having stems strongly ligneous, prostrate but not subterranean; branchlets leafy; leaves firm, not rounded and not conspicuously reticulate, whitened beneath; aments many-flowered; bracts conspicuously hairy; stamen usually 1.

Section *Herbaceae* Borrer (1830) was based exclusively on *S. herbacea*, the only species of the group occurring in Great Britain. It therefore could have been no broader or more inclusive than that species. Several species have been added since.

The idea of the scope of sections in *Salix* has been a gradual evolution, as have most ideas in systematic botany. From 1828 to 1866, Koch, Fries, Hartig, and Wimmer had placed *S. herbacea*, *S. polaris*, *S. retusa*, and *S. reticulata* (all the prostrate creeping willows they had in Europe) in a single section, though under three different section names. But by 1860, Kerner (NiederOst. Weid.) had placed *S. retusa* and *S. herbacea* in section *Retusae*, *S. polaris* in section *Myrtosalix* under *S. myrsinites*, and created a new genus, *Chamitea*, for the *Reticulatae* (*S. reticulata et al*).

Andersson, described by Fernald (p. 29) as "the most accurate student ever to work on *Salix*", monographed the willows of the world (DC. Prodr. **16** (2)) in 1868. In section *Myrtosalix*, he placed most of the present section *Ovalifoliae* and also *S. cascadensis* (as *S. tenera*, p. 288), *S. phlebophylla* (p. 290), and *S. uva-ursi* (as *S. Cutleri*, p. 292). In section *Retusae*, he placed *S. retusa* (p. 293) with many Asian species, and in *Herbaceae* he placed *S. herbacea*, *S. polaris*, and *S. rotundifolia*, with some Old World species, and including *S. glacialis*, which is merely juvenile *S. ovalifolia* (the type species of section *Ovalifoliae*). The two most closely related species, *S. phlebophylla* and *S. rotundifolia*, are placed in different sections.

Schneider (Bot. Gaz. **67:** 48. 1919) includes in section *Herbaceae* the following North American species: *S. cascadensis* (NW. U. S. & adj. Can.), *S. Dodgeana* (NW. U. S.), *S. phlebophylla* (NW. N. A.), *S. polaris* (circumpolar), *S. rotundifolia* (NW. N. A.), and *S. uva-ursi* (NE. N. A.). He suggested, however, that *S. uva-ursi* was widely separated by its bicolored leaves and single stamen.

In creating section *Uva-ursi*, Fernald compares the type (and only) species, *S. uva-ursi*, solely with *S. herbacea*, the only other

species of section *Herbaceae* occurring within the Manual range. No mention is made of the others, some of which are much more like *S. uva-ursi* than they are like *S. herbacea*. It seems desirable to take up the description of this 1-species section, point by point.

1. "Stems Strongly Ligneous". The five species commonly placed in section *Herbaceae* with *S. herbacea* and *S. uva-ursi* vary considerably in plant size but all of them have the ligneous prostrate stems, not or only partly subterranean, often "forming extensive superficial and very leafy carpets", as Fernald said of *S. uva-ursi*. *S. polaris* is more nearly like *S. herbacea*. The other four are more like *S. uva-ursi*. Several authors speak of the stems of these others as being partly subterranean. Furthermore, *S. herbacea* is not always a delicate plant with slender stems. Dutilly 6605 (Herb. Ball) from Chesterfield Inlet has stout and strongly ligneous stems to 4 mm. thick, and other specimens have stems anything but delicate.

2. "*Branchlets Leafy*". Both species and section Uva-ursi are described as having "leafy branchlets", while *S. herbacea* is said to have short branchlets with only 3–4 leaves. Most species have fewer leaves on short branchlets and more on longer ones. That holds for all those assigned to section *Herbaceae*. Linton, a life-long personal student of willows, says (Mon. Brit. Willows, p. 79. 1913) that the short branchlets of *S. herbacea* have 3–5 leaves. My Iceland specimen, specially collected by Wm. F. Palsson (No. 146) in 1939, has 5 branchlets with 6 leaves each and 2 branchlets with 7 leaves each. *S. polaris* shows about the same numbers. It is more similar in habit to *S. herbacea* while the other four are more similar to *S. uva-ursi*.

3. "Leaves Firm". The leaves of *S. uva-ursi* (*S. Cutleri*) undoubtedly are firm, Andersson (1868) calling the adult leaves extremely rigid. But the leaves of *S. phlebophylla*, *S. rotundifolia*, *S. Dodgeana*, and *S. cascadensis* also are firm. Of *S. phlebophylla*, Andersson said (1868, p. 290) that the leaves are coriaceous but, more strangely, he called those of *S. polaris* "coriaceo-rigidibus" also. The leaves of *S. phlebophylla* remain attached and skeletonizing for 2 or 3 years. For section *Herbaceae*, Andersson described the leaves as "coriaceo-indurata".

4. "Leaves Not Rounded". They also are not rounded in some of the other species of *Herbaceae*. *S. phlebophylla* has

obovate-spatulate or elliptical-spatulate leaves, *S. Dodgeana* has smaller but similar elliptical-obovate leaves, while those of *S. rotundifolia* are roundish. These three are very closely related. *S. cascadensis* has linear-oblong or narrowly elliptical leaves. Of the seven related American species, three have leaves more or less roundish and four have not.

5. Leaf Margins. *S. uva-ursi* and *S. herbacea* are alike in having the blades crenulate-serrulate, a fact not mentioned by Fernald. The serrations of *S. herbacea* sometimes are prolonged and inflexed. *S. polaris* has the blades sometimes slightly crenulate-serrulate. The others have entire leaves.

6. "Leaves Not Conspicuously Reticulate". Study of 47 specimens of *S. uva-ursi* (Herb. Ball), 20 from New England and Lower Canada and 27 from Labrador Peninsula, shows that, practically without exception, their leaves are reticulate on one or both surfaces. "Reticulate" is used here as showing prominent tertiary veins connecting the secondary (lateral) veins, and so forming nets. On specimens collected early in the season, reticulation is not well developed but even then conspicuous reticulation will be found on the lower surface of several leaves and on the upper surface of one here and there. Its prominence increases as the season progresses and the leaves become older, many collections showing the lower surface conspicuously reticulate and the upper becoming more so. Collections in late August and September usually show both surfaces prominently reticulate, resembling those of *S. ovalifolia.* Andersson (1868, p. 292) stated that the leaves of *S. uva-ursi* (*S. Cutleri*) had the elevated nerves reticulate beneath, just as he said for both surfaces of *S. herbacea* (p. 298).

All of the species under discussion have the secondary (lateral) veins prominently developed. All of them show a tendency to become reticulate with age, especially *S. phlebophylla*, which is most comparable to *S. uva-ursi* in habit, and in size and shape of leaves, and in progressive reticulation also. The leaves of *S. rotundifolia*, though smaller, show exactly the same range of reticulation, and those of *S. Dodgeana* show it also but less markedly. These three are most closely related to *S. uva-ursi*. Even the long slender leaves of *S. cascadensis*, with the secondaries closely crowded, show occasional reticulations on one or other side of individual leaves.

7. Leaves "Whitened Beneath". The leaves of *S. uva-ursi* are glaucescent ("whitened") beneath, whereas those of *S. herbacea* and the others species under discussion normally are green beneath. However, *S. cascadensis*, which extends from Wyoming and Utah to Washington and British Columbia, produces plants with some of the leaves glaucescent beneath throughout its range. No plant with all leaves glaucescent has been noted. Coville (Will. of Alaska) says that the leaves of *S. polaris* are green or somewhat glaucescent beneath, but the writer has not observed such glaucescence.

But Section *Lucidae* has green-leaved species (*S. lucida* and *S. caudata*) and glaucous-leaved species (*S. serissima* and *S. lasiandra*), the first member of each pair being eastern (manual range) and the second western. Section *Cordatae* also has green-leaved species (*S. myrtillifolia, S. monochroma* and *S. pseudocordata*) and glaucous-leaved species (*S. cordata* Muhl., *S. Farrae, S. ligulifolia, S. lutea* and *S. mackenziana*), the first-named species in each group occurring in the manual range. And Fernald himself named a glaucous-leaved variety (*brachypoda*) of green-leaved *S. myrtillifolia*. He also named a widely-distributed glaucous variety (*hypoglauca*) of the narrowly localized green-leaved *S. pedicellaris* Ph. Evidently, glaucousness need not be uniform in sections.

8. Petiole Length and Thickness. The leaves of *S. uva-ursi* were said to be "short-petioled" (not included in section description) while those of *S. herbacea* were described as "slender-petioled". These are not truly contrasting terms. Gray's Manual does not mention the petioles. Those of *S. herbacea* are described in Britton and Brown (Illus. Fl.) and Britton (Man.) as "very slender, 4–8 mm. long" and those of *S. uva-ursi* as 2–4 mm. long.

A study was made on 57 specimens of *S. herbacea* (Herb. Ball), 7 from south of the St. Lawrence and 50 from north of it. In the southern plants the petioles were from 1–4 or occasionally 5 mm. long and mostly stout. On the 50 northern plants the leaves average smaller and the petioles shorter, mostly 1–3 mm., occasionally 4 mm., and only once reaching 5 mm. In width, they varied from 0.3–1 mm., and mostly between 0.5–0.6 mm., which is not "slender" for organs of those lengths. Gardner

176 from Cut-throat Id., Labrador, has leaves to 2.2 cm., and petioles to 3–5 mm. long and 0.8 mm. wide (stout). Gardner 1075 from Hudson Bay has petioles 2–3 mm. long and 0.7 mm. wide. Potter & Brierly 8727 from Eclipse Harbor, Labrador, has petioles 3 mm. long by 1 mm. wide. In European *S. polaris*, closely related to *S. herbacea*, the petioles range from 1–3 or 4 mm. long.

On 20 specimens of *S. uva-ursi* (Herb. Ball) from New England and Lower Canada, the petioles average just a little less in width than those of *S. herbacea*. Of the two, therefore, *S. uva-ursi* really has the "slender" petioles.

9. "Aments Many-Flowered". The aments of section *Uva-ursi* are described as "many-flowered", while *S. herbacea* is said to have "2–8-flowered tiny aments". In Gray's Manual (1908), the aments of *S. uva-ursi* are described as 2–3 cm. long in fruit, while those of *S. herbacea* are said to be 4–10-flowered, on 2-leaved branchlets. Britton & Brown (Ill. Fl., in 1896) and Rydberg in Britton (Man., in 1901) both describe the pistillate aments of *S. uva-ursi* as 2–5 cm. long in fruit, and the aments of *S. herbacea* as 4–8 mm. long and 4–10-flowered, on 2-leaved branchlets.

Andersson (in DC. Prodr. **16**) in 1868, is not definite about ament size on the 6 species included but he does say that those of *S. herbacea* (p. 298) are 3–12-flowered, on usually 2-leaved (subbifolios) branchlets, and that those of *S. polaris* (p. 299) are 3–9-flowered. In 1858, however, he stated (Sal. Bor.-Am.) that the aments of *S. uva-ursi* (*S. Cutleri*) are an inch long and that those of *S. phlebophylla* (p. 73) are minute to ½ inch or 1 inch long. Wimmer (Sal. Europ.), in 1866, not concerned with American *S. uva-ursi*, recorded the aments of *S. herbacea* as 4–12-flowered, *S. polaris* as few-flowered, *S. retusa* as 4–15-flowered, and *S. reticulata* as many-flowered. Linton, a life-time student of British willows, stated (Monog. Brit. Will., p. 79. 1913) that the catkins on *S. herbacea* are ½–¾ inch long, the pistillate 3–12-flowered and rarely elongating to nearly an inch. This is not exactly "tiny".

Most of the 57 specimens of *S. herbacea* in Herb. Ball are late-collected and do not have fruits. The mostly depauperate Labrador specimens have at least 8 flowers and perhaps more.

One from Campbell Lake, NWT. (Radford 186) has 10 or more. Steinmetz 1134 from Mt. Katahdin, Me., has aments 1 cm. long and with 10 or more flowers. Merrill from Mt. Katahdin in 1898 has one ament 1.7 cm. long (not tiny), and with 12 or more flowers. It is difficult to count the capsules on mounted specimens without injuring them. European specimens of *S. herbacea* in my herbarium are 8–14 flowered. A vigorous Iceland specimen is 10–16- (or 17)-flowered (double the number allowed by Fernald) and the aments are up to 1.5 cm. long, which scarcely is "tiny".

10. Two-Leafed Peduncles of S. Herbacea. Fernald draws no distinction between *S. uva-ursi* and *S. herbacea* on this point. However, Andersson referred to the peduncles of *S. herbacea* as "subbifolios" and most later writers have called them "2-leaved". One Hungarian specimen in Herb. Ball shows 3 leaves and the Iceland plant has 3–4 leaves per peduncle.

11. "Bracts Conspicuously Hairy". The flower scales in new section Uva-ursi are described as "conspicuously silky" and those of *S. herbacea* as "nearly glabrous". Andersson in 1868 said that the bracts of *S. herbacea* were glabrous or gray-pilose and Linton in 1913 calls them glabrous or thinly pubescent. But in 1868, Andersson, "the most accurate student ever to work on *Salix*" (Fernald, p. 29), calls the bracts of *S. uva-ursi* (*S. Cutleri*) obscurely villose; those of *S. polaris* "glabris vel villosulis"; those of *S. phlebophylla* white-pilose or barbate; those of *S. rotundifolia* as sufficiently long-ciliate; and those of *S. cascadensis* (*S. tenera*) as long-pilose. Do the white-pilose bracts of *S. phlebophylla* and the long-ciliate bracts of *S. rotundifolia* put these two intimately related species in different sections?

12. "Stamen Usually 1". The staminate ament of section Uva-ursi is described as having "stamen usually 1", and *S. uva-ursi* as having "stamens solitary (rarely 2)". Schneider says (p. 50) that he has "very rarely found two stamens in one flower". The uni-staminate condition is found to about the same degree in *S. purpurea*, the European basket willow widely introduced in Colonial America. It also characterizes *S. sitchensis* and *S. Coulteri* (section *Sitchenses*), and occurs occasionally in other diandrous species.

It is a phenomenon of the *Diandrae* only and is caused by more

or less complete fusion of the two filaments. When the "rarely 2" stamens occur, the union has not taken place. But the staminate expression is not as simple as that. All degrees of fusion occur. The two filaments may be entirely separate, as noted, or they may be united for any fraction of their length (¼, ½, ¾, ⅞) or all of it. Sometimes when the filaments are completely united, there still will be two separate anthers. Sometimes these also will be united into one. The partial union of the 2 filaments occurs in numerous species of the *Diandrae* and usually is described as "filaments sometimes united at base" or "for part of their length".

In Summary. The characters alleged to separate section Uva-ursi from *S. herbacea* (type species of section *Herbaceae*) have been reviewed above, in comparison with those of five related North American species usually assigned to section *Herbaceae*. From the data presented, it is clear that either: (1), section *Uva-ursi* must be rejected outright; or (2), some four other American species must be added to it and the description completely rewritten. But first it must be decided whether there is sufficient difference between two groups in these seven species to warrant recognition of two separate subsections or sections. These two groups include *S. herbacea* and *S. polaris*, on the one hand, and *S. uva-ursi*, *S. phlebophylla*, *S. rotundifolia*, *S. Dodgeana*, and *S. cascadensis*, on the other. That decision, however, will require full study of many related European and Asian species. Such study has not been made.

New Section Argyrocarpae Fernald

In creating section *Argyrocarpae*, Fernald says merely that the type species, *S. argyrocarpa*, "stands so far apart from other willows that it deserves a place in the system of sections". This is dogmatic assertion, not science. No supporting facts are given, except that Schneider, whom Fernald had just previously denounced (p. 14) as the author of "what has been called this Schneid. treatment" of certain American willows, is here rehabilitated as a "close student of the genus" because he did not assign *S. argyrocarpa* to any existing section.

This new section includes only *S. argyrocarpa* Andersson, and the description reads: "Shrub 0.2–1.7 m. high; leaves shining-

silky (micaceo-sericeis) beneath; pedicels elongated, 2–4 times as long as the two glands; stamens 2." Actually, instead of being "far apart from other willows", it is a blood brother to *S. pellita,* also of the Manual range, and closely related to *S. bella, S. Drummondiana,* and *S. subcoerulea* of western America. It is not distantly related to four or five other species. Previous treatments are discussed below.

Andersson, in 1867 (Monog. Sal., pp. 106 & 125) and 1868 (in DC. Prodr. **16** (2): 233 & 240), described two sections: 11, *Argenteae* or *Repentes,* and 12, *Virentes* or *Phylicifoliae,* and arranged all of the then-known American species of section *Argenteae* in one or the other of the two. He described each section briefly but only a few really contrasting characters are given. These contrasts are noted below, with a few significant but non-contrasted characters included in parentheses.

Sect. 11, Argenteae or Repentes. Shrub often low; leaves long, linear-lanceolate, most often silvery-tomentose (sharply nerved above), margin revolute or serrate; aments subsessile; capsules more or less pedicelled, commonly sericeous; style short but distinct.

Under this section, Andersson arranged numerous species belonging to five more or less different groups: 1, *S. sitchensis,* the type species of section *Sitchenses;* 2, *S. argyrocarpa,* the subject of our discussion, of which more later; 3, *S. petiolaris,* and thereunder, as subspecies or varieties, *S. subsericea, S. gracilis,* and *S. sericea,* at present recognized as species or varieties; 4, *S. humilis* and *S. tristis,* commonly assigned to section *Capreae* (along with *S. discolor, S. Scouleriana,* and the European *S. caprea* and *S. cinerea,* grown in America as florists' willows); and 5, the little European *S. repens,* along with other Old World species.

Sect. 12, Virentes or Phylicifoliae. Shrub often tall; leaves broad, subobovate or ovate-lanceolate, commonly glabrous, (glaucescent below), remotely inflexed-serrulate, nerves subparallel; aments subsessile; (bracts black-tipped, pilose), capsules pedicellate, (conic-rostrate); commonly silky (called "glabrous or tomentose" in 1867. CRB.); style rostrate.

Four groups of American willows were assigned by Andersson to this section: 1, *S. phylicifolia* (*S. planifolia* Ph.), *S. fulcrata*

and *S. phylicoides* (both *S. pulchra*), these and other American and Old World species actually comprising section *Phylicifoliae;* 2, *S. Drummondiana* and *S. chlorophylla* Anders. (the latter including present *S. pellita* Anders. and *S. subcoerulea* Piper), all belonging to section *Argenteae* and discussed more fully later; 3, "*S. macrocarpa* Nutt.", which, whatever it was, obviously was not Nuttall's plant (*S. Geyeriana* Anders.); and 4, *S. humillima* (*S. arbusculoides* Anders.), also discussed later on. He included also *S. arbuscula* L., and many other Old World species.

Under these two section names, Andersson thus assembled a miscellaneous mass of species actually belonging to several widely different sections of the genus. He should not be too severely blamed for this confusion. He was attempting the impossible task of writing up the willows of the world (for DC. Prodr.) in a limited time, and with inadequate material probably not all before him at one time.

Much inaccurate description results from these two groupings of unrelated species. For example, his *Argenteae* are assigned long, linear-lanceolate leaves but those of *S. sitchensis*, *S. humilis*, and *S. tristis* are distinctly oblanceolate and narrowed at the base, and in the first two species often broadly oblanceolate and cuneate. The leaves also are described as strongly nerved above but those of *S. argyrocarpa* are just the opposite. In section *Phylicifoliae*, the leaves are described as broad, subobovate or ovate-lanceolate, and also are said to be "commonly glabrous" (the real *Phylicifoliae*). But those of *S. pellita* and *S. arbusculoides* are narrowly lanceolate and those of both *S. pellita* and *S. Drummondiana* are among the most densely hairy of American willows. The "conic-rostrate capsules" really occur on *S. humilis* and *S. tristis*, listed in section *Argenteae* but not belonging to either section.

Eight (or 9) of the ten (or 11) North American species commonly assigned now to section *Argenteae* are scattered at intervals, by Andersson, through both his *Argenteae* and *Phylicifoliae*. Only four (or 5), *S. argyrocarpa*, *S. petiolaris* (and *S. gracilis*), *S. sericea*, and *S. subsericea*, were placed in *Argenteae*. Four others, *S. arbusculoides*, *S. Drummondiana*, and *S. chlorophylla* (covering both *S. pellita* and *S. subcoerulea*) were placed in *Phylicifoliae*. These 8 (or 9) species, with two others not known

to Andersson (*S. bella* Piper and *S. coactilis* Fernald), may be divided into two natural groups. Some may regard these groups as representing subsections and some as representing sections. In either case, the species of each group belong together.

The first group is characterized by leaves with margins revolute and either entire or sparingly undulate-crenulate, the lower surface mostly densely velutinous or silvery-tomentose, the extra-numerous secondary veins impressed in the upper surface, prominently elevated beneath, and diverging from the midrib at relatively broad angles, like the ribs of a vertebrate. Here belong *S. argyrocarpa*, and *S. pellita* of the Manual range, and *S. bella*, *S. Drummondiana*, and *S. subcoerulea* of the Rockies and/or westward. Of these, only *S. argyrocarpa* is placed by Andersson in *Argenteae*, where it belonged.

The second group is characterized by leaves serrate or serrulate on the non-revolute margins, the lower surface densely to thinly covered with short silvery hairs or somewhat glabrate, the secondary veins of normal number and elevated on both surfaces. and diverging from the midrib at the usual sharper angles. This groups includes *S. arbusculoides* (far Northwest) and *S. coactilis* Fern. (unknown to Andersson), *S. petiolaris*, *S. sericea*, and *S. subsericea* (all Manual range). Only *S. arbusculoides* was placed in *Phylicifoliae* by Andersson.

Schneider, 50 years after Andersson, and with much more copious material, did almost as illogical a job (Jour. Arnold Arb.). He follows Andersson in dividing these related species between two sections. In section *Griseae* (*Argenteae*), he placed (**2**: 13–25. 1920) *S. sericea*, *S. coactilis*, and *S. petiolaris*, but omits *S. argyrocarpa* from both sections. He also adds, as did Andersson, *S. humilis* and *S. tristis*, both belonging to section *Capreae*. In section *Phylicifoliae* (**1**: 67–91. 1919), with the several species really belonging thereto, he placed *S. bella*, *S. Drummondiana*, *S. pellita*, and *S. subcoerulea*, but omitted *S. arbusculoides* from both sections.

Still later (**2**: 84–89. 1920), he treats both *S. arbusculoides* and *S. argyrocarpa* at great length but is unable to assign them to any existing section. Like Fernald, he gives no reason why he could not place each with its respective group, even if he could not unite the two groups. Like Andersson, Schneider was attempt-

ing the impossible task of a monograph of unfamiliar American willows in limited time and under conditions of physical and mental stress (he was interned, on meager pay, with an otherwise unsupported family in Germany).

There is nothing in Andersson's descriptions of his *S. argyrocarpa* and *S. pellita* which indicates other than closely related species. Andersson compared them himself and rejected close relationship because *S. argyrocarpa* had pedunculate aments and pedicelled capsules whereas *S. pellita* had sessile aments and short-pedicelled capsules. Yet Andersson, in 1868, reduced *S. sericea* to a variety of *S. petiolaris*, although the latter had leafy-peduncled aments and long-pedicelled capsules while *S. sericea* had almost sessile aments and short-pedicelled capsules! Why should the same two characters which permitted one pair of distinct species to be arranged as a species and its variety prevent another pair, much more alike vegetally, from belonging to the same section? Such decisions are sheer nonsense, and it is not clear why Schneider and Fernald chose to follow them.

Both *S. argyrocarpa* and *S. pellita* have narrow leaves with revolute margins, the nerves impressed above and prominent below, the numerous secondaries diverging from the midrib at broad angles, and the blades covered densely with long silvery hairs at first but often becoming quickly and unevenly glabrate to glabrous. These facts should have brought recognition of their very close relationship long ago. On three sheets of unnumbered specimens of *S. pellita*, collected by Fernald at Ft. Fairfield, Me., on June 5, 1901 (Herb. Ball), different portions could be described as varieties based on degrees of pubescence or its absence. The same variation is seen commonly on *S. argyrocarpa*.

In Conclusion

1. The whole purpose of botany, including taxonomy (but not synonymy) is to enable more people to know more about more plants. That purpose is not served by dogmatic assertions without supporting facts. Only useless, confusing, and expensive synonymy is increased thereby.

2. If more living plants and more herbarium specimens were studied more thoroughly, there would much more knowledge and fewer names.

3. If keys were constructed primarily on vegetal characters, representing the major portion of the organism and present throughout most or all of the year, instead of floral characters (soon gone with the wind), willows would be much better known.

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Unverified Bibliography of Scirpus.—Thinking to add to the *Manual* treatment the names of sections under *Scirpus*, I automatically and very naïvely turned to the enumeration of sections in Beetle's *Studies in the Genus Scirpus VII, Conspectus of Sections represented in the Americas*, in Am. Journ. Bot. xxxi. 261–265 (1944). I should have known what to expect, after having been obliged to analyze the work of that ambitious author on morphological characters and elementary geography and other details[1]; but I imagined that, after pretty severe criticisms of his wholesale lack of precision, his work would have become more accurate. Most unfortunately, however, I was in for further disillusionment; and, since too many students, uncritically accepting what they see in print, especially when it has passed the Editorial Committee of the American Journal of Botany, are likely to suppose (as I did) this Conspectus of the sections of *Scirpus* to be authoritative, it becomes an unwelcome duty to designate some of the most misleading points. This I do as briefly as is consistent with clarity, Beetle's sectional bibliography repeated in smaller type, this followed in 9-point by statement of a few mere facts.

(1) Section Oxycaryum Nees, Mart. Fl. Bras. 2: I. 90. 1847 . . . . based on *Scirpus cubensis* Poepp. & Kunth.

Nees in Martius, Fl. Bras. ii[1]. (1842—not 1847) defined his new genus (not section) *Oxycaryum* with a single species, *O. Schomburgkianum*, named for the famous collector, the type from British Guiana.

(2) Section Monocephales Clarke, Kew Bull. Add. Ser. 8. 111–113. 1908.

C. B. Clarke (not one of the earlier Clarkes) in vol. viii of the Kew Bull. Add. Ser. enumerated all the 10 sections of *Scirpus* which he recognized in the entire world. Two to five sections were defined, with typical

[1] See Rhodora, xliv. 479–484 (1942) and xlv. 279–296, especially pp. 279, 280, 284, 290 and 291 (1943).

species cited, on each page, but none of them stretched over pp. "111–113". On p. 111 Clarke defined his *Scirpus*, sect. Monostachyae but I find no sect. "*Monocephales*" nor any other section beginning *Mon;* and there are none ending "*cephales*". Not one of the four species placed by Beetle in his wrongly ascribed, wrongly spelled and wrongly constructed § "*Monocephales*" was mentioned by Clarke under his § *Monostachyae.*

(3) Section Reigera Opiz. Sezman 83. 1852.

Opiz (not an abbreviation), in a mere list of names, in his Seznam (not Sezman), these quite without a word of description and with *Reigera* defined only by having its single binomial based on *Scirpus maritimus* L., obviously published a *nomen nudum,* his generic name being illegitimate. That is not the definition of a section!

(4) Section Nemocharis Beurl. Bot. Notiser Pl. Ind. Occ. 13. 1825.

Just what "Bot. Notiser Pl. Ind. Occ." may be I do not know; neither did Pritzel nor Urban (Symb. Antill. i. 12). According to the Royal Society Catalogue Beurling's first paper was published in 1842. So, turning to the well known Swedish Botaniska Notiser, we find in the volume for 1853 Beurling's new genus (not section) *Nemocharis*, based on *Scirpus sylvaticus*, properly defined on p. 52, the binomial on p. 53. That was not as a section; but in his Plantae Vasc. seu Cotyl. Scand. 55 (1859) Beurling divided *Scirpus* into two subgenera: "**Scirpus Linn. a. Nemocharis Beurl.**" (with citation of Bot. Not. l. c.); and **"b. Euscirpus"** with two sections, "*α. Phyllantheli:* 2. S. maritimus Linn. . . . . *β. Cladanthei:* 3. S. lacustris Linn." The section including *S. sylvaticus* is § *Phyllothryon* Döll. Fl. Baden, i. 305 (1857), also § *Phylloscirpus* Pax, l. c. (1887).

(5) [Section] Androcoma Nees, in Hook. Jour. Bot. 2: 1. 91. 1847.

The bibliography is as bad as in the other cases. In Hook. Journ. Bot. ii. 396 (1850) *Androcoma* was first described, as a new genus (not a section). § *Androcoma* (Nees) Benth. in Benth. & Hook. Gen. Pl. iii. 1051 (1883) includes, as treated by Pax in Engler & Prantl, Nat. Pflanzenf. ii^2. 112 (1887), the three genera of Nees: *Androcoma*, *Blepharolepis* and *Oxycaryum.*

(6) Section Trichophorum Pers. Syn. Pl i: 69. 1805.

Persoon did not make a section, but with absolute clarity published the genus *Trichophorum* with three species: *T. cyperinum*, based on *Eriophorum cyperinum* L.; ? *T. lineatum*, based on *Scirpus lineatus* Michx.; and *T. alpinum*, based on *Eriophorum alpinum* L. These belong in three different sections as now understood. In 1823 Mertens & Koch, in Röhlings Deutschl. Fl. i. 452, made the subgenus *Eriophorum* subgen. *Trichophorum*, consisting in Germany only of *E. alpinum*, the other two species of Persoon's genus *Trichophorum* being strictly North American. Dalla Torre & Harms (p. 31) consider this treatment an emendation of Persoon's original and that the subgenus consists solely of *E. alpinum;* consequently, by their reasoning, *Trichophorum* (emended) is strictly *Eriophorum alpinum.* Several botanists have accepted this interpretation, but it should be noted that Mertens & Koch did not materially alter

the definition of *Trichophorum* and in a flora of Germany they could include only *Eriophorum alpinum;* they could not include Persoon's other two species because they do not grow in Germany.

The next important change was that of Nees, in his highly significant *Uebersicht der Cyperaceengattungen* in Linnaea, ix. 293 (1834), who redefined the genus *Trichophorum* to include only *T. cyperinum* (L.) Pers. That, unlike the treatment of Mertens & Koch, was a true emendation of the genus and may be accepted as fixing the restricted application of the name. Kunth, in his philosophical discussion, *Über die Linnéischen Gattungen Scirpus und Schoenus*, in Berlin. Abhandl. (1835) 40, promptly accepted this emendation and called "*Trichophorum cyperinum* Pers. . . . dem Typus der Gattung". Later, Bentham, l. c. 1052 (1883), although holding all three of the original species as segregated by Persoon, split *Eriophorum* into two sections: "Genus quoad setas hypogynas in sectiones 2 parum naturales dividitur:—1. *Trichophorum,* setis 6 tenuissimis longe crispo-flexuosis vix tamen gossypinis". That was, apparently, the first treatment of *Trichophorum* as a section, although under *Eriophorum.* The first use of § *Trichophorum* in the sense of *Scirpus cyperinus* L. (the type of *Trichophorum*) and under *Scirpus* appears to be the quite unwitting one of Beetle in Am. Journ. Bot. xxxi. 264 (1944). Since he there cites the original Persoon reference and defines (in English) the characters of the section, we may assume that his section is the same as *Eriophorum* § *Trichophorum* (Pers.) Benth. If someone who fully realized what he was doing had earlier made the proper combination, as a sectional name under *Scirpus,* I have missed his publication. It seems too bad to saddle upon an author a combination which he did not know he was making.

(7) Section BAEOTHRYON Ehrh. 4: 147. 1789.

Assuming that "Ehrh. 4" means Ehrh. Beitr. iv. and turning to that volume one comes to Ehrhart's 100 *monomials* which are explicitly cited as illegitimate and having no nomenclatural status in Art. 67 (3) of the International Rules of Plant Nomenclature. The name *Baeothryon,* however, although illegitimate when published by Ehrhart (certainly not as a sectional name), was properly published with diagnosis as a true GENERIC NAME by A. Dietrich, Spec. Pl. ii. 89 (1833). Nomenclaturally the name starts with A. Dietrich. Although Ehrhart was certainly not the author of *Scirpus,* § *Baeothryon,* that combination was properly published by Endlicher, Gen. 118 (1836).

(8) Section ELEOGITON Link, Hort. Berol. 1: 293. 1827.

As one might expect to find, *Eleogiton* was defined by Link as a GENUS, not a section, and on p. 284 (not 293). It is *Scirpus,* § *Eleogiton* (Link) Reichenb. Icon. Fl. Germ. viii. 38 (1846), as § *Heliogiton.*

(9) Section ISOLEPIS R. Br. Prod. Fl. N. Holl. 221. 1810.

As all critical students of the taxonomy of the *Cyperaceae* know, Robert Brown defined a GENUS (not a section), this later becoming *Scirpus,* subgen. *Isolepis* of Benth. in Benth & Hook. l. c. 1050 (1883), also of Pax and other authors (some presumably much earlier). § *Isolepis* (R. Br.) Reichenb. l. c. 39 (1846) is at least safe, although it is possible that the

section was properly named earlier than in 1846. It certainly was not so treated by Robert Brown.

(10) Section Actaeogeton Reich. Icon. Fl. Germ. Helv. 40. 1846.

Reichenbach's Icones consisting of 24 large volumes, published from 1834 to 1909, exact bibliography would seem to call for the number of the volume. In vol. viii. 40 (1846) Reichenbach placed the annual *Scirpus supinus*, along with other annual species, in his § *Isolepis*. His next section was § *Schoenoplectus*, a series of mostly stoloniferous perennials; and under that section his first subsection (not section) was subsect. *Actaeogeton*, consisting of the single coarse Old World *S. mucronatus* L. These plants belong to *Scirpus*, § *Schoenoplectus* Reichenb. l. c. They are *Scirpus*, § *Eu-Scirpus*, C. B. Clarke, l. c. 112 (1908), with sub-§§ *Mucronatae* (*S. supinus* L., *mucronatus* L., *americanus* Pers., *Olneyi* Gray and their allies), *Lacustres* (*S. lacustris* L. and many others) and *Littorales* (*S. riparius* Presl, etc.). The § *Actaeogeton* Reichenb. emend. Beetle, Am. Journ. Bot. xxix. 653 (1942) seems to be a fairly clear section. Since Reichenbach treated it as a subdivision of the genus, it may be cited as of Reichenb. emend Beetle, l. c.

(11) Section Schoenoplectus Palla, Sitzb. Zool. Ges. Wien. 38: 49. 1888.

Since *Scirpus*, sect. *Schoenoplectus* was definitely published by Reichenb. l. c. 40 (1846), the section taken up under that name by Benth., l. c. 1051 (1883), by Pax, l. c. 112 (1887), and by Dalla Torre & Harms, Gen. Siph. 31 (1900), it is a bit unusual to cite it as starting in 1888.

(12) Section Pterolepis Schrad. Goett. Gel. Anz. 3: 2071. 1821.

Pterolepis Schrad., as one has learned to expect, was published by him as a genus. Its members are placed by Reichenbach, Bentham, Pax, and Dalla Torre & Harms in § *Schoenoplectus*. If kept apart it is *Scirpus* § *Pterolepis* (Schrad.) Endlicher, l. c. (1836).

(13) Section Holoschoenus Link, Hort. Berol. i. 293. 1827.

Again a genus of Link's, said to be his section. The section started as *Scirpus*, sect. *Holoschoenus* (Link) Koch in Linnaea, xxi. 619 (1848).

The sectional names which I have here taken up are not, necessarily, all final. I can not take the weeks of time to follow them through to absolute finality. That is a task for a competent specialist on *Scirpus*, when he appears. For the present, however, their bibliographic bases are more certain than the large portion (essentially 100 per cent.) of error which pervades the unfortunate publication which induced these memoranda.—M. L. Fernald.

Some Noteworthy Catskill Plants.—The presence of several plant species of boreal affinity in the Catskill Mountains, New York, where they are comparatively isolated, seems worthy of mention.

In 1943, Mr. Edward M. Shields published a delightful article entitled *Porcupines and Ferns* [Am. Fern. Jour. **33** (2): 57–59], in which he described the finding of *Dryopteris fragrans* (L.) Schott var. *remotiuscula* Komarov (as *D. fragrans*) in the Catskills. As this represented a considerable range extension, the writer was glad to join Mr. Shields and Dr. Edgar T. Wherry on June 24–26, 1946, in a further search for this species and associated plants.

We investigated a number of cool, moist, north-facing ravines in the vicinity of Haines Falls, Greene County, and found the object of our search growing profusely in several of them, together with a few plants of typical *Lycopodium selago* L. and large quantities of *Sedum roseum* (L.) Scop.

The nearest previously known localities for *D. fragrans remotiuscula* are north-central Vermont, the Adirondack region, and various points around the Great Lakes. *L. selago* ranges further south on the higher peaks of New England, and is found at several widely separated localities in the Appalachians, south to North Carolina. *S. roseum*, like the others, is a circumpolar boreal species with a very sporadic range in northeastern United States, being known along the coast of Maine, at two localities in Vermont, at Chittenango Falls, Watkins Glen and Seneca Lake, N. Y., opposite Port Jervis and at Nockamixon Rocks, both along the Delaware River in Pennsylvania, and at Roan Mountain, North Carolina.

At the Haines Falls, New York, locality of the above it was noted that the soil about the roots of these plants was slightly acid, with a pH of 6 as determined by several readings. At Haines Falls itself, where the moist, overhanging cliffs have long been known to support such plants as *Woodsia glabella* R. Br. and *Cryptogramma stelleri* (Gmel.) Prantl, the soil, as well as the water dripping from the cliffs, was neutral with a pH of 7. Growth conditions at the two places seemed identical except for the slight difference in pH, yet the distinction apparently is sufficient to prevent intermingling of the two groups of boreal species.

Pressed specimens of all the above plants have been deposited at the Academy of Natural Sciences of Philadelphia.—GEORGE R. PROCTOR, University of Pennsylvania.

THE USE OF FORMALDEHYDE IN PLANT COLLECTING[1]

RICHARD EVANS SCHULTES[2]

The preparation of plant specimens for the herbarium is not a difficult task. The usual procedures, however, are sometimes awkward to apply or unsatisfactory under certain conditions. Such is the case, for example, in unfavorable tropical climates or when treating certain groups of plants in which immediate and rapid drying causes undesirable changes in the plant tissues, resulting in the disintegration of the specimen upon subsequent handling.

As is well known, the general procedure is to dry plant specimens in the field. Some botanists are accustomed to use gasoline pressure stoves, in which case the plant press, with the specimens between blotters and corrugated metal or cardboard sheets, is suspended above the source of heat so that currents of hot air pass up through the corrugated sheets. The position of the press is changed from time to time, and the specimens dry rapidly, requiring from two to forty-eight hours, depending upon the texture and fleshiness of the tissues.

Other botanists prefer to dry more slowly, placing the press of corrugated sheets with plants in the sun so that the specimens dry gradually with solar heat and wind which circulates between the corrugates.

In my opinion, specimens prepared by these two procedures in the field can be of equally high quality. If the specimens be carefully prepared, one usually cannot distinguish those dried rapidly with artificial heat from those dried slowly with solar heat. The difference between the two methods is not in the

[1] Translation from the Spanish, by the writer, of an article entitled: "El uso de formol en la recolección de plantas" which appeared in the *Revista de la Facultad de Agronomía* (Medellín, Colombia) vol. vi, no. 22 (1946) 46–52.

[2] Agent (Botanist) United States Department of Agriculture; Research Fellow, Harvard Botanical Museum; Collaborator, Instituto de Ciencias Naturales (Bogotá).

quality but in the quantity of specimens which can be dried in a given period of time.

For collectors who are accustomed to gather many specimens of each number or many numbers, it is necessary to use artificial heat in order to dry rapidly, thus avoiding the accumulation of too much material which, in moist and hot climates especially, rots in a very short time. Some plant collectors, however, gather few specimens and few numbers since they are specializing in certain genera of plants; these investigators can easily take advantage of solar heat to dry their limited material without the danger of an over-accumulation.

During my four and one-half years of botanical activity in the Amazon drainage-area of Colombia, I have experienced considerable difficulty in the use of artificial and solar heat for drying specimens. Nearly all parts of the Colombian Amazonía are heavily forested, completely uninhabited or, at most, only very sparsely populated, lacking in communication facilities linking it with the centers of the nation, and without even the most indispensable equipment for work of this type. As it is my custom to spend long periods in botanical exploration away from centers, I have very frequently been beset by insurmountable difficulties in plant preparation. Neither the use of solar heat nor the employment of a gasoline stove has been satisfactory, although my collections are never extensive.

In the Amazon jungles, the procurement of gasoline for stoves is a constant and serious difficulty. When it is available, it is usually of an inferior quality that rusts and clogs the delicate mechanisms of pressure stoves. These mechanisms are often impossible to replace, and their repair in the field is usually out of the question. Nor can one utilize solar heat in most parts of the Amazon Valley because in these regions, especially during the "rainy season", the sky is often overcast for a number of consecutive days or even weeks, thus making it impossible to dry specimens in a press before their putrefaction and disintegration.

For these and other reasons (especially the great danger of fires, as well as the inevitable difficulty of having to travel great distances in open canoes with the voluminous equipment required by botanical work—tins, blotters, newspaper, tripods,

stoves, presses, gasoline drums, etc.—which always must be protected from storms and water), I decided to abandon drying in the field and use the method of preserving the undried specimens, pressed, in formaldehyde and sending them to Bogotá that they may be prepared conveniently and carefully there with an electric stove.

This method, which I have employed now for more than two years and which was suggested to me by Mr. Paul H. Allen, is little used amongst botanists and plant collectors because it is apparently not widely known. Various colleagues have shown such surprise in the success and the simplicity of this procedure that I have decided to publish the present article to recommend it highly, hoping that its advantages may also be of help to colleagues who are working in tropical climates.

The specimens are prepared as though they were to be dried at once in the field: i. e., between double news-sheets of ordinary size (12″ x 18″). The plant specimens are arranged, one to a sheet, and then pressed in the standard botanical press made of iron and chains or of wood and canvas straps. The plant material is left under heavy pressure for a day; when time permits, it is taken out to be rearranged before applying formaldehyde. An enamel metal tray of rectangular form about 10″ x 15″ and 3 or 4 inches deep is convenient. Into this tray, a quart of commercial 40% formaldehyde and one and one-half quarts of water are poured and mixed thoroughly. The open plant press is placed at the side of the tray, and the pressed specimens are dipped into the solution one by one. After a few moments in the solution, they are replaced, still dripping, between the news-sheets. The news-sheets with the specimens are placed one above the other and immediately put under pressure as previously applied. No blotters or cardboards are required unless an occasional specimen be extremely woody or pulpy. During the bath or before, the specimens may be numbered in the manner used by the collector. One must bear in mind, however, that the writing of some colored pencils is obliterated by formaldehyde; this can be avoided by using a heavy indelible pencil.

Once all of the specimens are well arranged and sufficiently pressed, they are enclosed in a rubberized bag or in any airtight container and are not removed again (except when one desires

to add more specimens prepared on successive days). Under these conditions, the plants will be conserved without damage for a month or more.

If shipment to a center must be delayed, it may be necessary to add a bit more formaldehyde to each specimen. This is done simply by bathing the specimens again or by spraying with a small amount of the formaldehyde-water mixture, then replacing the bundle in the rubberized bag. If transportation is not to take too much time, for example, about fifteen days, the concentration of formaldehyde can be weakened and up to two quarts of water or more per quart of formaldehyde can be added. If the plants are to be sent by mail, it is best to remove the pressed specimens from the press and tie them tightly in a bundle with twine. Then they should be wrapped in a double canvas to avoid as much as possible evaporation of formaldehyde during the trip.[3] The canvas should be strongly sewn, and the address may be printed on it with indelible pencil.

If the collection of a plant specimen be of any scientific value, then it follows naturally that the best attention and care should be given to its preparation.

At the present time, I am having excellent success in the use of the method described above. I am sending monthly collections of plants by mail from various parts of the Colombian Amazonía to the Instituto de Ciencias Naturales in Bogotá where they are dried with great care by well prepared technicians who have good stoves and excellent equipment as well as time at their disposal.

In the tropical jungle regions of Colombia, the very conservation of plant specimens already dried is a problem. Humidity, fungi, rats, ants, termites, worms, cockroaches and numerous other destructive agents, not to forget man and his usual carelessness, are constant and tireless enemies. For the difficulty of keeping dried specimens until shipment, if not for the other reasons mentioned above, I consider highly advisable the use of formaldehyde in plant collecting.

[3] Writer's note: Since publication of this article in Spanish, I have experimented with the use of the impermeable rubber-paper commercially known as "pliofilm" in wrapping bundles of formaldehyde-dipped specimens. The results have been highly successful. This pliofilm is a paper which does not crack and which can be sealed completely with a hot iron, providing an absolutely evaporation-proof container in which the effects of the formaldehyde will last many weeks longer.

In herbaria and in zoological museums, it is customary to preserve large and fleshy specimens of fruit and animals in bottles with solutions of formaldehyde. There is said to be one disadvantage in the continual conservation of vegetable material in formaldehyde, and that is the hardening of cellular tissues and the consequent difficulty in making microscopic or macroscopic dissection. However, I have been able to show by dissections of *Hevea* material that the use of formaldehyde in collecting as previously outlined does not harden the plant tissues unduly. It is also evident from the collections that specimens which have been under formaldehyde treatment in a plant press for as long as three months dry with artificial heat as well as or better than specimens which are dried immediately in the field. I have used formaldehyde with varying percentages of ethyl alcohol, but it appears that this is in no way advantageous and that formaldehyde alone, diluted in water as explained above, is sufficient. One quart of commercial 40% formaldehyde, diluted, is sufficient for preparing about 200 specimens. It has afforded me considerable satisfaction to see how successfully plants which are usually difficult to prepare and which often discourage the collector can be dried after treatment with formaldehyde. Fleshy plants such as many species of *Ficus* and *Clusia* as well as the pseudobulbs of many orchids flatten and soften under the influence of pressure and formaldehyde. Various species of *Melastomaceae* and *Loranthaceae*, usually brittle and fragile when dried, are conserved strong and resistant if first treated with formaldehyde. Flowers as delicate as those of *Clusia*, of various species of the *Lecythidaceae*, *Leguminosae* and *Bombacaceae*, and, curiously enough, the marvellous aquatic flower of *Victoria regia* are prepared very neatly with this procedure. Numerous *Leguminosae* with finely pinnate leaves, whose leaflets almost always fall during drying, are preserved intact. We might also include many *Bignoniaceae* and *Convolvulaceae*, some *Solanaceae* as well as *Cucurbitaceae* and *Passifloraceae* and others with membranaceous or ephemerous flowers.

Lactiferous trees, such as species of *Hevea, Castilla, Sapium, Couma* and *Hancornia*, usually lose their leaves very rapidly due to fermentation of the latex and formation of an abscission layer. I have used the formaldehyde procedure with excellent

success in the preparation of hundreds of specimens of *Hevea*, in which the flower as well as the fruit is very susceptible to rapid putrefaction and in which the trifoliolate leaves very often disintegrate, even when subjected to immediate artificial heat shortly after collection.

One disadvantage in using formaldehyde is the damage it causes to the skin. Since it is a dehydrating agent, it cracks and blackens the hands after several days' contact and an acute pain is produced. This may be avoided by the use of rubber surgeons' gloves or by smearing the hands with vaseline or cold cream before bathing the specimens. Pincers may also be used to handle the plants. However, when one is collecting and preparing plants continuously and over long periods, my experience indicates that these precautions are very much more troublesome than the physical inconvenience caused by the chemical.

The formaldehyde method should be convenient not only for professional collectors who are working at great distances from their bases, but it should also prove of use to students who often make botanical excursions of a few days' duration, who have no time to prepare and dry their material during the trip, and who find it difficult to carry bulky botanical equipment. If one uses formaldehyde, one needs carry only a plant press, newspaper, a tray and a bottle of formaldehyde. This equipment is so light and easy to carry that it can be taken even by aeroplane. On occasional trips, the purpose of which is not strictly botanical, the formaldehyde "kit" would be useful because one might unexpectedly arrive at some remote locality where it would be possible to find plants of importance to phytogeographical investigations.

In the case of extensive collections, it might seem that the cost of formaldehyde would be excessive due the exorbitant cost of this chemical at the present time in Colombia. In reality, however, if one considers the conveniences it affords, the formaldehyde procedure is not costly even under present conditions. Where there are no facilities to use other methods of collecting and drying, it must be considered false economy to forego the use of formaldehyde for fear of its initial cost. It should be considered an insurance policy for work which requires so much

interest and sacrifice on the part of the naturalist-collector. Furthermore, although all of us ought to work as economically as possible, the time has come to insist that botanists do not have to carry out their expeditions and explorations in the traditional manner with microscopic budgets compelling them to travel about almost like beggars asking alms.

The best materials and the most modern methods ought to be available to the botanist (as in the case of most other scientists), for he is dedicated to one of the oldest, most profound and most fascinating of the sciences and one which is, at the same time, of fundamental economic importance for the progress of mankind.

Bogotá, Colombia

A New Station for Epipactis Helleborine in New Hampshire.—In view of the scarcity of stations in New Hampshire for *Epipactis Helleborine* (L.) Crantz, I am recording a station on the northeastern section of Bear Island in Lake Winnepesaukee in Meredith. The colony is small, about twenty plants, and the possibility of introduction from any near-by cultivated gardens is remote. The plants grow on a hillside of mixed trees in moist soil and there is evidence of a temporary brook in the spring. I found no plant over a foot high and most of them were smaller. One specimen has been sent to the Gray Herbarium, another to the Philadelphia Academy of Natural Sciences; and seeds have been retained for a trial on artificial culture media. The previous record for New Hampshire is of a small colony at Plainfield, somewhat farther west, noted by Alan W. Upham in Rhodora, xliv. 456 (1942).—Robert J. Titherington, Philadelphia 38.

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W. S. White

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VERBASCUM PHLOMOIDES (tall, in center), V. THAPSUS (lower, at right) and ERIGERON CANANADENSIS (left)

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 49. March, 1947. No. 579.

THE GROUP OF ELEOCHARIS PALUSTRIS IN NORTH AMERICA

H. K. Svenson

Key to the E. palustris Group in North America

a. Basal scales of spikelet solitary and spathiform, completely encircling the base of the spikelet....b.
  b. Achenes prominently reticulate-pitted....c.
    c. Tubercle ovoid, nearly equalling to larger than the achene; spikelets castaneous to purplish. Sea coasts, Alaska to northern Quebec........................*E. kamtschatica*
    c. Tubercle pyramidal, much smaller than the achene; spikelets castaneous. Near the coast, Massachusetts to Louisiana; Cuba..................................*E. fallax*
  b. Achenes smooth to faintly reticulate....d.
    d. Culms elongate-filiform, spikelets 30–40-flowered with obtuse scales; tubercle conic, only 0.2–0.45 mm. wide at base. Western New England to margin of Great Plains..*E. calva*
    d. Culms usually thicker, frequently inflated or rigidly flattened....e.
      e. Spikelets few-flowered, the 5–30 scales usually lustrous purple; tubercle conic, only 0.2–0.4 mm. wide at base. Sea coasts, Hudson Bay to Virginia...............*E. halophila*
      e. Spikelets frequently many-flowered, scales stramineous to purplish; tubercles conic to lanceolate. Western North America..........................*E. macrostachya*
a. Basal scales of spikelet usually 2 or 3 below the thinner fertile scales, the lowest not encircling the base of the spikelet....f.
  f. Tubercles depressed-deltoid, scales acuminate, and culms wiry in southern part of the range; the entire plant becoming soft with elongate tubercles northward. Newfoundland to Alabama, west to the Mississippi River......*E. Smallii*
  f. Tubercles depressed-deltoid to lanceolate; culms variable. Western North America..........................*E. macrostachya*

Note: *E. palustris* of recent authors (as to American plants) is here included under *E. Smallii* and *E. macrostachya*.

E. palustris. The standard account of this species has been that of Lindberg, Acta Soc. Fauna et Flora Fennica **23,** no. 7: 16. 1902, in which three species were segregated in northern Europe, essentially as follows:

1. Achene obovate, the conic tubercle sharply differentiated from the achene and higher than broad. . *Scirpus* (*Heleocharis*) *eupaluster*.
2. Achene light brown, rounded, the thickened tubercle almost sessile (i. e. slightly confluent), tubercle broader than high. *S.* (*Heleocharis*) *mamillatus*.
3. Spikelets uniglumate, achene dark brown, obviously punctate, the thickened tubercle broader than high *S.* (*Heleocharis*) *uniglumis*.

As pointed out by me in Rhodora **41:** 57. 1939, *Eleocharis palustris* in northern Europe is frequently intermingled with uniglumate plants without other differences. The specimen of *E. palustris* in the Linnaean Herbarium is *E. mamillata* Lindberg, and so annotated by him. As to the ribbonlike and terete (at least in dried material) culms differentiating *E. mamillata* and *E. palustris* respectively, I can see in this feature only environmental influence. The achenes of the *E. palustris* group in northern Europe are more coarsely cellular-reticulate and the tubercle broader at the base, with a tendency to be less distinct from the body of the achene than in North American material. From these points of view I think the species of Europe can be maintained as distinct from American representatives of the group. *E. uniglumis* is, I believe, only an ecological variant in brackish water; achenes with similar punctate achene-surface are occasional in fresh-water lakes. And finally, the higher-than-broad tubercle seems to be only an indication of the increasing softness of tissues which one finds in aquatics of high northern latitudes, and which I suspect may be associated with the fast but short growing period. Such soft plants, in the extensive European collection of *E. palustris* which Dr. Samuelsson gave me, seem to be characteristic of the northern parts of Scandinavia. Diminutive representatives collected by Carl Alm in Lule Lappmark are almost identical in appearance with *Fernald, Long, & Fogg* 1339 from Bay of Islands, Newfoundland, though the tubercle is subulate in much of the Newfoundland material. These northern plants seem to me to be modifications, with less rigid tissues, of the southerly plants—in Europe of broad-tubercled *E. palustris;* in eastern North America of *E. Smallii.*

First of all, I see no value in differentiating as species the ecological variants of northern European *E. palustris*, namely *E. palustris*, *E. mamillata* and *E. uniglumis*. They intergrade freely and the distinctions are of the most academic character. If necessary to distinguish them in the literature, the present designations can be employed or they can be designated informally—it makes little difference. In Europe there are quite evidently additional variations, such as the dwarf plants represented by collections from Rumania, with small achenes and broad tubercles. Perhaps these are connected with the variations of *E. palustris* in western Asia.

To return to North America: the complexities of *E. macrostachya* of western United States have already been discussed by me in Rhodora **41:** 55–59. 1939, and the considerable amount of material which has been submitted to me for identification since that time, has merely strengthened the opinions which I had formed. I believe that this species is comparable with *E. palustris* of Europe in respect to the labile uniglumate condition, and in the frequent darkening of scales where the plant is in contact with maritime conditions. *E. macrostachya* occupies the entire range of western states, extends southward into northern Mexico, and ranges north to 59° (*Raup* 1972) in the region of Great Slave Lake in northern Canada. It reaches eastward to western Minnesota, Ortonville (*Moyer* in 1898, hb. Univ. of Minnesota); Iowa (Palo Alto and Clay Counties); and western Missouri. The boundary of *E. macrostachya* to the northeast is unknown and the chief remaining problem of the *palustris*-group in North America is the relationship of *E. macrostachya* to the contiguous *E. Smallii* of northeastern North America.

I think that the two species are distinct—at least no decision should be made to unite these two recognized representatives of the flora of eastern and western North America until the material can be studied very closely at the points of contact. Fortunately Dr. Ada Hayden has supplied me with good collections from Iowa, which I have mentioned as one of the contact points of the two species.

Eleocharis Smallii Britton was described from the Susquehanna River at Harrisburg, Pennsylvania. The culms were of extraordinary thickness and much wider than the spikelet.

The species was differentiated from the European *E. palustris* in Torreya **3:** 23, figs. 1–2. 1903, and, also by the bulbiform base of the tubercle, in Britton and Brown, Ill. Fl. ed. 2, **1:** 310. 1913, as follows:

Scales pale green to straw-color . . . . *E. macrostachya*
Scales brown to purple-brown.
  Tubercle flattened-conic; spikelet thicker than culm . . . . *E. palustris*
  Tubercle swollen, bulb-like; spikelet not thicker than the culm . . . . *E. Smallii*

Fernald and Brackett in 1929 recognized *E. Smallii* as a wide-spread plant, which had slender as well as thickened culms. I would go a step further and include practically all the material now recognized as *E. palustris* in eastern North America, under the name *E. Smallii.* In the southern part of its range, this species is characterized by the bulbiform base of the tubercle which becomes "depressed-deltoid, umbonate or broad-ovate, as broad as or broader than long" (Fernald and Brackett, p. 59). The wiry culms, firm black-bordered sheath-apex, and hardened acuminate scales also distinguish this species from *E. calva.* There seems to be no transition to the uniglumate *E. halophila* of the Atlantic coast. When the zone of the Canadian Forest is reached northward, the texture of *E. Smallii* becomes softer and the tubercle tends to lose its bulbous character, reaching a linear-subulate form in some of the collections at the northern limit of range. These changes are shown in the illustrations of *E. Smallii* and "*E. palustris*", Rhodora pl. 181 and 182. 1929; and especially the photograph, Rhodora pl. 547, where "E. palustris" from Nova Scotia is shown (fig. 21) in its transitional stages. Such material extends to Hudson Bay, where it approaches slender material of the western *E. macrostachya* in its appearance. Whether there is any actual connection with *E. macrostachya* across the Canadian wilderness from Manitoba to Hudson Bay cannot be determined until collections are known from that region. From *E. Smallii*, as well as *E. macrostachya*, typical *E. palustris* of Europe differs in the much coarser style and style-branches, in the generally larger achenes with broader, nearly sessile tubercles, and a decided reticulation of the achene-surface.

It is now of importance to find points at which the rigid form of *E. Smallii* with the bulbiform tubercles gives way to the soft

plant with elongate tubercles and soft scales. That is not so easy, for in Newfoundland both forms are found. *Fernald & Wiegand* 27,520 from St. John Bay is a fine example of the narrow-tubercled form. In this collection the body of the achene is 1.8–2.0 mm. long and 1.0 mm. wide; the tubercles vary from 0.3 x 0.5 mm. to 0.25 x 1.0 mm., i. e. the linear tubercle may be four times as long as wide. *Fernald & Wiegand* 2702 from Ingornachoix Bay shows intermediate tubercles. It has the identical outward appearance and achene-body of *Wiegand & Hotchkiss* 27,521 from St. Barbe Bay in northwestern Newfoundland, a collection which has elongate tubercles. On the diorite table-land of the Blomidon Mts. and in similar places, the form of *E. Smallii* with short tubercles characteristic of the southern part of the range, is abundant.

In Quebec the long-beaked extreme of *E. Smallii* is occasional, such as the following collections: Bic, Rimouski Co. *Fernald & Collins* 922; Little Metis, Matane Co. *Fowler;* Cap Chat, Matane Co. *Fernald & Smith* 25,496; Madeleine Pt., Gaspé Co. *Kelsey & Jordan* 24; Magdalen Islands, *Marie-Victorin & Rolland-Germain* 9352; New Richmond, Bonaventure Co. *Collins & Pease* in 1904.

The fine collections assembled by E. C. Ogden in western and northern Main frequently show tubercles which are very slightly higher than broad. These plants quite evidently represent the beginnings of the transition phase. From Rev. Lepage I have received numerous collections from the east side of Ungava Bay, 52–54° N. Some mature specimens, such as *Dutilly & Lepage* 12,644, are of the narrow-tubercled form; others, such as 12,645, have broad tubercles. Some of these plants are definitely uniglumate, and it is possible, as I mentioned previously, that they may be a continuation of the uniglumate forms of *E. macrostachya,* found along the Pacific coast from Puget Sound northward. Too little mature material is known from the Hudson Bay region and from the Canadian Pacific coast.

Polunin, Journ. Linn. Soc. London **52:** 367. 1943, cites *E. palustris* from southwest Greenland (Kiagtut and Igaliko) approximately 60–61° N., saying "These are *E. uniglumis:* many of the culms exceed 50 cm. in height and 2 mm. in breadth when pressed; seems nearer to *E. palustris.*" Whether these are the European or the American plant I do not know.

E. fallax Weatherby, Rhodora **24:** 23. 1922. *E. nervosa* Kuekenthal, Rep. Spec. Nov. **23:** 192. 1926. *E. ambigens* Fernald, Rhodora **37:** 394. 1935. References have been made by me to these plants in Rhodora **41:** 64. 1939, but I had not then the solution to the problem. *E. fallax* was described from a single colony (or plant?) on Cape Cod, Massachusetts: "It has the aspect and entire sheaths of the group of *E. palustris*, but is at once distinguished therefrom by its three-parted styles and bluntly trigonous achenes. It combines some of the characters of *E. capitata* (*E. tenuis*) and *E. arenicola*." *E. ambigens*—the name signifying its relationship to two groups—extends from Massachusetts to Louisiana along the coast. Because of the wrinkled achene-surface, it was very early confused with *E. compressa*. The dark red lucid sheaths are quite characteristic. Dissection of spikelets of the *palustris*-group will disclose occasional 3-parted styles. I have seen them in *E. kamtschatica* (*Lepage & Dutilly* 12,313 from Ungava, and *Anderson* 852 from Alaska); in *E. Smallii* (*Lepage & Dutilly* 12,644 from Ungava); and in *E. palustris* (*Fröding* from Vermland, Sweden). In *E. ambigens* 3-parted styles are relatively more frequent; one or two in each spikelet examined from *Fernald, Griscom & Long* 4568, but approximately 50 per cent in the spikelets of *Smith & Hodgdon* 621, both collections from Virginia.

E. kamtschatica (C. A. Meyer) Komarov; Fernald & Brackett, Rhodora **37:** 395. 1935. This Asiatic species, with the tubercle often as large as the body of the achene and with the achene-body strongly reticulate-pitted, has been known from Alaska. It now appears on Hudson Bay, and in two localities on the Atlantic Coast, and is represented by the following collections: Hudson Bay, *Burke* (G) (labeled as *E. palustris* var. *Watsoni* by N. L. Britton); east coast of Hudson Bay, Ungava, Quebec, 52–54° N. *Dutilly & Lepage* nos. 13,408, 13,556, 13,356 and (?) 13,408; Paradise River, Labrador, (53° 30′ N.) *Bishop* 101 (G); R. Romaine, north coast of Gulf of St. Lawrence, Quebec, *Marie-Victorin & Rolland-Germain* 20,165 (G). This species has been the basis of some of the reports of *E. uniglumis* in eastern North America; on the other hand, some cited collections such as *Fernald & Wiegand* 2706 from the mountains of Newfoundland are not uniglumate at all, and to my mind are perfectly typical *E. Smallii*.

E. CALVA Torrey. This is a plant with filiform culms, and many-flowered spikelets, predominantly of calcareous areas of northeastern United States. It extends from Quebec and western New England to Virginia and Tennessee, west now to Minnesota where it is abundant; eastern North Dakota (Butte, *Lunell* 789); northeastern Nebraska (*Clements* 2552 from lowlands of Missouri River); northwest Iowa (*Hayden* 8247, Buena Vista Co.); Missouri (Jackson Co., *Bush* 58); and Oklahoma (Ottawa Co., *G. W. Stevens* 2431). All material to the west of this area appears to be the coarser *E. macrostachya*, which is frequently uniglumate.

E. SMALLII Britton. Extends southward to Delaware, West Virginia, and in the Cumberland Mountains to Tennessee (Norris Reservoir, *Hess & Penfound*, July 14, 1938; Dunlap, *Svenson* 10,113) and northern Alabama (Muscle Shoals, *T. F. Hall*, June 21, 1938). To the westward it enters Wisconsin (including *Fassett* 16,739 from Drummond); extends through much of northern Minnesota and reaches western Iowa and Missouri.

E. HALOPHILA This few-flowered uniglumate plant of the Atlantic seacoast extends from Hudson Bay to Virginia.

BROOKLYN BOTANIC GARDEN,
BROOKLYN, N. Y.

VERBASCUM PHLOMOIDES IN IOWA

W. A. ANDERSON

(Plate 1055)

Verbascum phlomoides L. is by far the commonest mullein around Iowa City. It has been here for at least thirty-five years, as shown by herbarium specimens, though published accounts are very recent (1) (2). In an attempt to account for the disparity between descriptions in current manuals (3) and the plant as seen in the field, the writer has been watching colonies of mullein for the past three seasons and has come to the following conclusions:—

The mature form of *Verbascum phlomoides* is a gigantic weed, 1.5 to 2 m. high, shooting from a large winter rosette into flower-

ing condition by about the first of July. The rosette leaves all disappear and stem leaves remaining are all more or less decurrent by long ruffled auricles which clothe the stem from the ground to the inflorescence. These leaves are progressively more acuminate from ground to the inflorescence. The inflorescence consists of a central spike or spike-like raceme with several smaller lateral racemes from the axils of upper leaves. This plant is *V. thapsiforme* in the sense of Hegi (4) not of Murbeck (5).

If the plant is cut early in the summer or even after it has flowered, it sends up one to several sprouts which may be a meter high or less, with a single slender interrupted raceme and sessile or petioled leaves. This is *Verbascum phlomoides* of Hegi 6: 1 p. 14 fig. 5 and other manuals. It makes a good herbarium specimen and is the form best represented in our collection (see Sherff, l. c.). This form is most common in August and September.

The winter rosette forms in late summer. It consists of leaves up to 0.5 m. long and 2 dm. wide with short petioles which are hidden at the base of the rosette. These rosettes may be distinguished from those of *V. Thapsus* by the acute tips and crenate margins of the leaves, as well as the silvery rather than yellowish pubescence.

Murbeck maintains *V. thapsiforme* as a separate species, although he states that it is closely related to *V. phlomoides*.

The accompanying photograph (plate 1055) of *V. phlomoides*, *V. Thapsus* and some *Erigeron canadensis* was taken on the bank of the Iowa River, July 26, 1945. *V. phlomoides* is very ornamental, but in our locality is a more aggressive weed than *V. Thapsus*.

1. Miller, R. C. Proc. Iowa Acad. Sci. **51**: 235 (vol. for 1944) 1946.
2. Anderson, W. A. Proc. Iowa Acad. Sci. **52**: 91 (vol. for 1945) 1946.
3. Sherff, E. E. Rhodora **48**: 97 (1946).
4. Hegi, G. Illustrierte Flora von Mittel-Europa **6**: 1 p. 15 also tab. 234, fig. 3.
5. Murbeck, S. V. Monographie der Gattung Verbascum, Lunds Univ. Arssk. **29**: 2, 1933–1944. (Esp. pp. 25, 44, 46–48, 51–60, 85–90).

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NOTES ON THE COMPOSITAE OF NORTHEASTERN UNITED STATES

IV. SOLIDAGO.

Arthur Cronquist

It has been claimed by Mackenzie (Torreya **28:** 95–99. 1928) that the familiar coastal plain species long known as *Solidago stricta* Ait. (Hort. Kew **3:** 216. 1789) must properly be called *S. petiolata* Mill. (Gard. Dict. ed. 8. 1768), and that two other Miller names, *S. linearia* and *S. obtusifolia,* which appeared in the 6th edition of the Abridged Gardeners' Dictionary (1771) also apply to the same species. The original descriptions of these three Miller species, as they appeared when the plants were first provided with binomials, are here reproduced.

29. Solidago (*Petiolata*) caule paniculato, racemis confertis, foliis inferioribus lineari-lanceolatis petiolatis, caulinis sessilibus glabris. *Woundwort with a panicled stalk, clustered spikes of flowers, the lower leaves linear, spear-shaped on foot-stalks, and those on the stalks smooth, fitting close* . . . The twenty-ninth sort grows naturally at Philadelphia; the lower leaves are smooth, entire, narrow, and spear-shaped; they are three inches and a half long, and half an inch broad, standing on long foot-stalks. The stalks are round, smooth, and rise three feet high; they are garnished with very small smooth leaves which are entire, and fit close to the stalks. The flowers grow in a close panicle at the top of the stalk; they are of a bright yellow colour, and appear in September.

24. Solidago (*Linearia*) caule paniculato, pedunculis erectis, foliis linearibus glabris integerrimis sessilibus. *Golden-rod with a panicled stalk, erect foot-stalks to the flowers, and smooth, narrow, entire leaves* . . . The twenty-fourth sort sends out strong smooth stalks two feet high, garnished with rough spear-shaped leaves, indented on their edges; the upper part of the stalk divides into many slender branches, which are garnished with very small leaves, and are terminated by recurved racemi of bright yellow flowers.

26. Solidago (*Obtusifolia*) caule paniculato, racemis sparsis, pedunculis erectis, foliis inferioribus lanceolatis serratis caulinis obtusis integerrimis sessilibus. *Golden-rod with a panicled stalk, the spikes of flowers thinly disposed, the foot-stalks erect, the lower leaves spear-shaped and sawed, but those on the stalks obtuse, entire, fitting close* . . . The twenty-sixth sort hath purplish stalks which rise three feet high, and are closely garnished with rough spear-shaped leaves, slightly sawed on the edges, ending in acute points. The stalks are terminated by erect racemi of flowers, growing in clusters, of a bright yellow colour.

No specimens of *S. obtusifolia* and *S. linearia* are known to be extant, but these names pretty clearly do not apply to the plant

we know as *S. stricta*, which is glabrous throughout, and has a simple, unbranched stem, with the cauline and generally also the basal leaves entire, and the latter elongate and persistent. The two parts of the description of *S. linearia* are conflicting, but even if we assume, as did Mackenzie, that the second part of the description was misplaced and appeared under the twenty-fifth sort instead of the twenty-fourth, the paniculate stem and especially the sessile leaves effectively preclude *S. linearia* from being the same as *S. stricta*. Under *S. obtusifolia* and *S. petiolata* Miller noted (quite in accordance with *S. stricta*) that the cauline leaves were sessile, but the basal ones conspicuously petiolate. His statement that the leaves of *S. linearia* are sessile must therefore be assumed to apply to all of the leaves, or at least all that are present at flowering time.

The case of *S. petiolata* is not quite so clear. Most of the description is indeed suggestive of *S. stricta*. The basal leaves of the latter are commonly oblanceolate or linear-oblanceolate rather than linear-lanceolate and spear-shaped, but that difference may be merely one of description rather than of actuality. The main sticking point comes in Miller's words "caule paniculato" and "panicled stalk." The stem of *S. stricta* is uniformly simple and unbranched, a character which doubtless suggested the specific epithet to Aiton. Furthermore, the only known purportedly authentic specimen of *S. petiolata* is, according to Mackenzie, *S. odora*, a species which is even more difficult to reconcile with Miller's description. It therefore seems to me that the case for identifying *S. petiolata* Mill. with *S. stricta* Ait. is far from proven, and probably in fact incapable of proof, so that Miller's name is better recommitted to the limbo of nomina dubia. In this connection it may also be noted that *S. petiolata* had been in cultivation, according to Mackenzie, for ten years before the name was published. Those who know the laxity of the breeding habits of *Solidago* will realize that ten years is quite sufficient time for the production of hybrids unidentifiable with any of the wild species.

In the Synoptical Flora, Asa Gray treated *Solidago neglecta* T. & G. and *S. uliginosa* Nutt. as closely related species, and further listed *S. neglecta* var. *linoides* (T. & G.) Gray as a slender

form. The latter is now generally conceded to be the same as *S. uniligulata* (DC.) Porter, a name which, for nomenclatural reasons, must supplant *S. neglecta* if the two are considered conspecific. Gray further noted under *S. neglecta* that "Forms with almost entire leaves and strict panicle too nearly approach *S. uliginosa* Nutt., while some with large and serrate leaves are more like *S. arguta*." It is certainly true that some of the more robust forms of the bog plant *S. uniligulata* approach the upland *S. arguta*, but truly intermediate specimens which cannot satisfactorily be referred one way or the other are few. Between *S. uniligulata* and *S. uliginosa* on the other hand, there is no such clear-cut segregation. Both are marsh and bog plants, and their ranges, while not identical, are very similar. The more robust forms of *S. uniligulata* tend to have broader and more sharply toothed leaves than comparable forms of *S. uliginosa*, but both entities are extremely variable in habit, according to the environment.[1] The sole technical character available to separate these plants of such similar general appearance, habitat, and distribution, is that the branches of the inflorescence of *S. uniligulata* tend to be more or less recurved-secund, while those of *S. uliginosa* are straight and not secund. This is ordinarily a good specific character in *Solidago*, and is commonly used as one of the major key divisions, but such species as *S. missouriensis*, *S. mollis*, and *S. stricta* vary from not at all secund to distinctly so. In attempting to separate *S. uliginosa* from *S. uniligulata* I find not only a large proportion of specimens misdetermined by competent botanists, but also many which might about as well be referred one way as the other. The plants are usually large enough so that only one is mounted on a single sheet, but among the smaller specimens it is not unusual to find both types represented in the same collection, as, for example, in *Porter s. n.*, from Mt. Desert Island, Maine, *Gleason & Gleason 298*, from Cecil Bay, Michigan, and *Gleason Jr. 108*, from Grand Manan Island,

[1] Deam has pointed out in the Flora of Indiana that the most slender plants (*S. uniligulata* proper) are found near the center of the bog, and the most robust ones (*S. neglecta* proper) at the margin, with all intermediate stages in the intervening area, and Dr. R. T. Clausen tells me that his field observations in western New York are in accordance with those of Deam for Indiana, on this point. These observations, together with the fact that there is no obvious indication of a bimodal curve in the variation of the herbarium specimens, suggest to me that *S. neglecta* and *S. uniligulata* are not worthy of separate recognition.

New Brunswick. Dr. Clausen tells me that in western New York plants of the two inflorescence types grow together, and apparently hybridize freely, with no evident reduction in fertility of the hybrids, so that the separation becomes entirely arbitrary. Dr. L. H. Shinners also informs me that in southern Wisconsin the two types not only occur together and intergrade freely, but seem to form a single population. I therefore believe that the two species should be united under the older name, *S. uliginosa* Nutt. Since there is some difference in their range-outlines, and it is possible after close study to place most of the herbarium specimens in one group or the other, I am willing to maintain them as varieties.

To further complicate the problem, it seems that the original of *S. uliginosa* Nutt. is not the plant to which the name is now commonly applied, but rather *S. uniligulata*. Nuttall's name was founded on a plant collected by Pickering, which he described in part as having the "panicle very short, made up of small racemes, which are a little secuned". A Pickering specimen preserved at the Academy of Natural Sciences of Philadelphia bears Nuttall's label and the asterisk with which he denoted his new species, and matches his description very well. Dr. Pennell tells me that, since Pickering's plants were the property of the Academy rather than of Nuttall, the specimen mentioned should be considered the actual type of the species, rather than merely an isotype. The Pickering plant is without doubt the secund phase which has recently been passing as *S. uniligulata*, and is very well matched by a collection by Bayard Long from New Jersey. It furthermore bears Asa Gray's annotation as *Solidago linoides*, the annotation evidently made prior to his reduction of *S. linoides* to a variety of *S. neglecta*. The only discrepancy is that in the original description Nuttall says the plant came from Massachusetts, while the label, in Nuttall's own hand, indicates that it came from New Jersey. Dr. Pennell tells me that Pickering collected both in New Jersey and in Massachusetts, and that Nuttall probably merely made a slip of the pen in one place or the other, so that the matter is of no great importance. I am therefore at a loss to understand Gray's treatment in the Synoptical Flora, where *S. uliginosa* is described as having a non-secund inflorescence, and in the synonymy of *S. neglecta* var.

linoides is given "*S. uliginosa* Nutt. in Jour. Acad. Philad. vii. 101, in part, but not of his own herb. nor descr." As has already been noted, the original description called for a plant with the inflorescence "a little secuned", and matches the apparent type specimen preserved at Philadelphia, a specimen which Gray himself admitted to belong to the entity which has more recently been treated as *S. uniligulata.* I have found no further reference to the supposedly non-secund plant which is presumably in Nuttall's herbarium under the name *S. uliginosa* and which Gray apparently used to typify the name. Regardless of its possible existence and identity, it can scarcely controvert Nuttall's description and type; the name *S. uliginosa* in the strict sense must apply to the secund plant which has passed as *S. uniligulata* (DC.) Porter, and not to the non-secund plant to which it has generally been attached.

Since we are considering the secund and non-secund plants to be varieties of one species, it becomes necessary to find a varietal name for the non-secund plants which have previously passed as *S. uliginosa.* This is provided in *S. uliginosa* var. *peracuta* (Fern.) Friesn., based on *S. humilis* var. *peracuta* Fern. (The name was originally proposed at a time when Professor Fernald, unaware of the earlier *S. humilis* Mill., was using the name *S. humilis* Pursh for the plant which has generally passed as *S. uliginosa* Nutt.) I have examined the type at the Gray Herbarium, and find that it is merely an immature specimen which seems quite characteristic of the non-secund plant which has generally passed as *S. uliginosa.* The typical variety of the species may be known as

S. ULIGINOSA Nutt. var. **uliginosa** Cronquist, var. nov., based on *S. uliginosa* Nutt. Journ. Acad. Philad. **7:** 101. 1834.

The goldenrods which Asa Gray treated as the single species *S. humilis* Pursh have recently been passing in large part as *S. Randii* (Porter) Britt., *S. racemosa* Greene, and *S. decumbens* Greene. *S. racemosa* has been distinguished from the cordilleran *S. decumbens* by having more numerous (10–30 instead of 4–9) cauline leaves below the inflorescence, the leaves bearing axillary fascicles. *Krotkov 7952* from the Bruce Peninsula, Ontario, determined as *S. racemosa* by Fernald, has only 5 cauline leaves

below the inflorescence as in *S. decumbens,* but has axillary fascicles as in *S. racemosa.* Two of the three specimens at the New York Botanical Garden of *Martin 65*, from the type station of *S. racemosa*, in Virginia, lack the axillary fascicles, and a number of specimens from Maine to Virginia lack the fascicles except for some poorly developed ones at the base of the inflorescence, where they are often present in *S. decumbens. Turner 6*, from Fort Saskatchewan, Alberta, resembles *S. decumbens* in its relatively broad, blunt, crenate basal leaves, but has 20 leaves below the inflorescence, and a number of other western specimens have more than 10. Four specimens of *Sheldon, s. n.*, from Chaffee County, Colorado, have 10–15 leaves below the inflorescence, the middle and upper ones with axillary fascicles, and would thus key to *S. racemosa*, which has not previously been considered to extend to the western cordillera. It is true that *S. racemosa* generally has more numerous leaves than *S. decumbens*, and more often has axillary fascicles, but these characters are surely not sufficiently constant to warrant specific recognition. It should be noted that the approach of *S. decumbens* to *S. racemosa* is through *S. decumbens* var. *oreophila* (Rydb.) Fern., which Fernald has shown (Rhodora **38:** 202–204. 1936) is only the "lowland" phase of the alpine and subalpine *S. decumbens* sens. strict.

Although *S. decumbens* var. *oreophila* is difficult to differentiate sharply from *S. racemosa*, it is even more closely related to *S. Randii*, and specimens which very probably represent merely the extreme of variation of the one may so closely simulate the other that one is tempted to identify them with it. *Patterson 274*, for example, from Colorado, is in my opinion morphologically more similar to *S. Randii* than to *S. decumbens* var. *oreophila*, but probably represents merely the extreme phase of the latter. Similarly, a number of eastern specimens, especially from the Gaspé area and northern Michigan, seem more nearly like *S. decumbens* var. *oreophila* than either *S. Randii or S. racemosa.* The only reasonably constant differences that I have been able to make out between *S. decumbens* var. *oreophila* and *S. Randii* are that the western plants have more rounded basal leaves, with blunter teeth, than do the eastern ones, but intermediates are plentiful.

S. racemosa also passes into *S. Randii.* I am at a loss to separate them by the differences in prominence of the midrib of the leaves and length of the peduncles, which are given in the manuals. These tendencies are so inconstant that I find it difficult to believe that any botanist, after examining an ample suite of specimens, would seriously propose them as specific characters. The specimens with relatively narrow and on the average more numerous leaves than *S. Randii* do seem to constitute an entity of sorts, however, even though the distinction becomes entirely arbitrary. These specimens also tend to have a narrower inflorescence, with fewer heads and longer peduncles than *S. Randii,* but the differences are only in averages. One of the several specimens at New York of Plantae Exsiccatae Grayanae 5 (distributed as *S. humilis,* but bearing the Gray Herbarium correction label *S. racemosa*) has broader leaves and more compact inflorescence than the others, and would very probably be placed with *S. Randii* were it not associated with and otherwise so similar to more typical specimens of *S. racemosa.* It should also be noted that the inflorescence of *S. decumbens* var. *oreophila,* as treated by Fernald and others, varies from essentially like that of *S. Randii* to essentially like that of *S. racemosa.*

Unless one is to revert to the philosophy that anything worthy of a name should be called a species, I fail to see how the entities here discussed can be considered of more than subspecific importance. I am thus forced to return to the treatment of Asa Gray and use one name to cover the group. As Professor Fernald has shown (Rhodora **10:** 88–91. 1908), the name used by Gray, *S. humilis* Pursh, was founded on another species. The oldest available name of those so far mentioned is *S. Randii* (Porter) Britton, but we must also consider the species which Gray treated in the Synoptical Flora as *S. confertiflora* DC. Only two years before the publication of the Synoptical Flora, he had noted in his survey of the North American Solidago (Proc. Am. Acad. **17:** 191. 1882) that *S. confertiflora* was "probably only another form of *S. humilis*", and with this opinion I wholeheartedly agree. The more ample inflorescence and smaller heads which were attributed to *S. confertiflora* in the Synoptical Flora are seen to be wholly inconstant when a more ample series

of specimens is examined. *S. confertiflora* is, in my opinion, merely the more robust part of the entity which Fernald has recently treated as *S. decumbens* var. *oreophila*. Even *S. confertiflora* DC. is not the oldest available name, however, for it is antedated by *S. confertiflora* Nutt., and is thus illegitimate. Gray listed *S. glutinosa* Nutt. as a synonym of *S. confertiflora* DC.; I have examined an isotype of *S. glutinosa* at Philadelphia, and agree with Gray's identification of it. I am therefore adopting Nuttall's name for the aggregate species under consideration. The majority of the specimens may be identified by means of the following key. No attempt is made to give complete synonymy.

1. Basal leaves tending to be acute or acutish and serrate or crenate-serrate to subentire; east of the cordillera.........subsp. *Randii*.
  2. Heads large, the involucre mostly 6–8 (or 9) mm. high; plants robust, commonly 3–9 dm. tall, with numerous heads in an often branched terminal thyrse which may become loose and paniculiform; sand dunes along Lake Michigan....................................var. *Gillmani*.
  2. Heads mostly smaller, the involucre commonly 3–6 mm. high (occasionally larger in var. *racemosa*); plants usually smaller, mostly 1–6 dm. tall, but sometimes fully as robust as var. *Gillmani;* general distribution.
    3. Leaves narrow, the basal mostly 7–20 times as long as wide, tending to be subentire; inflorescence tending to be relatively loose and subracemiform............var. *racemosa*.
    3. Leaves broader, the basal mostly 3–8 times as long as wide, tending to be sharply toothed; inflorescence tending to be relatively compact and thyrsoid........var. *Randii*.
1. Basal leaves tending to be rounded or broadly obtuse and crenate to subentire; cordilleran......................subsp. *glutinosa*.
  2. Low, alpine or subalpine plants, about 5–15 cm. tall, with very short and compact inflorescence....................var. *nana*.
  2. Taller plants, growing at lower elevations, mostly 15–50 cm. tall, with more elongate inflorescence..............var. *glutinosa*.

Solidago glutinosa Nutt. subsp. **glutinosa** Cronquist, subsp. nov. *S. glutinosa* Nutt. Trans. Am. Phil. Soc. II. **7:** 328. 1841, sens. strict.

Solidago glutinosa Nutt. subsp. glutinosa Cronquist var. **glutinosa** Cronquist, var. nov. *S. glutinosa* Nutt. Trans. Am. Phil. Soc. II. **7:** 328. 1841, sens strict. *S. multiradiata* Ait. var. *neomexicana* Gray, Proc. Am. Acad. **17:** 191. 1822. *S. neomexicana* Woot. & Standl. Contr. U. S. Nat. Herb. **16:** 182. 1913. *S. oreophila* Rydb. Mem. N. Y. Bot. Gard. **1:** 387. 1900. *S. decumbens* Greene var. *oreophila* Fern. Rhodora **38:** 202. 1936.

Solidago glutinosa Nutt. subsp. glutinosa Cronquist var. **nana** (Gray) Cronquist, comb. nov. *S. humilis* Pursh var. *nana* Gray, Syn. Fl. **1**, pt. **2:** 148. 1884. *S. decumbens* Greene, Pitt. **3:** 161. 1897.

Solidago glutinosa Nutt. subsp. **Randii** (Porter) Cronquist, comb. nov. *S. Virgaurea* L. var. *Randii* Porter, Bull. Torrey Club **20:** 208. 1893.

Solidago glutinosa Nutt. subsp. Randii (Porter) Cronquist var. **Randii** (Porter) Cronquist, comb. nov. *S. Virgaurea* L. var. *Randii* Porter, Bull. Torrey Club **20:** 208. 1893. *S. Virgaurea* L. var. *monticola* Porter, Bull. Torrey Club **20:** 209. 1893.

Solidago glutinosa Nutt. subsp. Randii (Porter) Cronquist var. **racemosa** (Greene) Cronquist, comb. nov. *S. racemosa* Greene, Pitt. **3:** 160. 1897.

Solidago glutinosa Nutt. subsp. Randii (Porter) Cronquist var. **Gillmani** (Gray) Cronquist, comb. nov. *S. humilis* Pursh var. *Gillmani* Gray, Proc. Am. Acad. **17:** 191. 1882.

The familiar *Solidago speciosa* Nutt. of the eastern states, a tall plant with numerous usually large leaves, the basal and lower cauline ones commonly persistent and often very large, gives way on the western plains to an ecotype which is now commonly treated as var. *rigidiuscula* T. & G., a smaller plant, with narrower leaves, the basal and lower cauline ones scarcely enlarged and mostly soon deciduous. A third form, the var. *pallida* Porter, occurring in the Black Hills and the eastern part of the Rocky Mountains, retains the small size of var. *rigidiuscula*, but has the basal and lower cauline leaves commonly enlarged and persistent, and more strongly petiolate, the leaves often few and not infrequently a little larger than in var. *rigidiuscula*. A fourth phase, occurring in sandy places from Michigan and northern Indiana to Minnesota, has generally escaped recognition, although it was provided with no less than three specific names by Steele. It should be called

Solidago speciosa Nutt. var. **jejunifolia** (Steele) Cronquist, comb. nov. *S. jejunifolia* Steele, Contr. U. S. Nat. Herb. **16:** 223. 1913. *S. Fisheri* Steele, loc. cit. *S. Chandonnetii* Steele, ibid., p. 222.

The var. *jejunifolia*, as I understand it, is morphologically so similar to the few-leaved forms of var. *pallida* that if their ranges were not disjunct they would probably not be considered taxonomically separable. Dr. L. H. Shinners tells me, however, that var. *jejunifolia* is more or less strongly sweet-scented in the field, a condition which, so far as I am aware, does not obtain in the other varieties. Furthermore, the inflorescence tends to be

more open than in the other varieties, with fewer heads on longer peduncles, so that the extreme form looks very unlike the other varieties in that respect. It is suggested that var. *jejunifolia* may be derived from plants of var. *rigidiuscula* which invaded sandy habitats of this more northern area during the post-glacial xerothermic period.

In his discussion of the varieties of *Solidago rugosa*, Dr. Fernald speaks of a northern group of varieties which are predominantly of damp habitats, and a southern group, predominantly of drier habitats, the two groups differing in certain reasonably constant morphologic features. This coincidence of morphologic, ecologic, and geographic characteristics would seem to justify the recognition of each of the two groups of varieties as a subspecies.

Solidago rugosa Mill. subsp. **rugosa** Cronquist, subsp. nov. *S. rugosa* Mill. Gard. Dict. Ed. 8. No. 25. 1768.

Solidago rugosa Mill. subsp. rugosa Cronquist var. **rugosa** Cronquist, var. nov. *S. rugosa* Mill. Gard. Dict. Ed. 8. No. 25. 1768. *S. altissima* L. var. *rugosa* Torr. Fl. N. Y. **1:** 363. 1843. *S. rugosa* Mill. var. *typica* Fern. Rhodora **38:** 221. 1936.

Solidago rugosa Mill. subsp. **aspera** (Ait.) Cronquist, stat. nov. *S. aspera* Ait. Hort. Kew. **3:** 212. 1789.

Solidago ulmifolia Muhl. var. **ulmifolia** Cronquist, var. nov. *S. ulmifolia* Muhl. ex Willd. Sp. Pl. **3:** 2060. 1803, sens. strict.

Solidago ulmifolia Muhl. var. **Palmeri** Cronquist, var. nov. A var. *ulmifolia* differt caulibus hirsutis pilis patentibus.—Type: *E. J. Palmer 24111*. Shaded sandstone slopes, near top of north side of Magazine Mountain, Logan County, Arkansas, October 14, 1923. Additional specimens: Arkansas: *Palmer 29194*, Hot Springs, Garland County; *Palmer 24180* and *29602*, Magazine Mountain, Logan County; *Demaree 8072*, Bonneville, Logan County; *Demaree 11001*, Hot Springs, Hot Springs National Park, Garland County; *Demaree 19876*, Hector, Pope County; *Demaree 20145*, Ola, Perry County; *Demaree 20498* and *20512*, Cedar Glades, Garland County. Alabama: *Buckley s. n.*, Oct. 1838; *Biltmore Herbarium 15003*, Avondale, Jefferson County.

This remarkably constant variation is as yet known only from Arkansas and Alabama. All of the Arkansas specimens have the stem hairy to the base, but the two Alabama specimens have the lower portion glabrous, suggesting a transition to var. *ulmifolia*. This hairy-stemmed variety of *S. ulmifolia* has sometimes been confused with *S. rugosa*, from which adequate specimens

are at once distinguished by having the stems arise from a branching caudex, as in other forms of *S. ulmifolia*, instead of from long creeping rhizomes, as in *S. rugosa*. From the form of *S. rugosa* that occurs in its area it is further distinguished by its much thinner and scarcely rugose leaves, and longer softer pubescence, as well as by some less constant or less tangible features of habit.

Solidago yadkinensis (Porter) Small differs from *S. Boottii* Hook. chiefly in its slightly larger and broader heads (involucre mostly 3–4.5 mm. high in *S. Boottii*, 4.5–7 mm. in *S. yadkinensis;* rays mostly 2–5 in *S. Boottii*, 4–8 in *S. yadkinensis*). *S. yadkinensis* was originally described as a variety of *S. Boottii*, an interpretation in which I concur, since the differences are not great and many doubtful specimens exist. Unfortunately, Asa Gray's material of his *S. arguta* var. *caroliniana* seems taxonomically identical with *S. yadkinensis*, and his diagnosis further bears out the identity of the two. It therefore becomes necessary to transfer *S. arguta* var. *caroliniana* to *S. Boottii*.

Solidago Boottii Hook. var. **Boottii** Cronquist, var. nov. *S. Boottii* Hook. Comp. Bot. Mag. **1:** 97. 1835, sens. strict.

Solidago Boottii Hook. var. **caroliniana** (Gray) Cronquist, comb. nov. *S. arguta* Ait. var. *caroliniana* Gray, Syn. Fl. **1**, pt. **2:** 155. 1884.

The New York Botanical Garden

Sedum Rosea, not S. roseum.—The boreal Roseroot has long been passing erroneously under the name *Sedum roseum* "(L.)" Scop. but some American botanists seem to have overlooked the very clear discussion of the name by Sprague in Journ. Bot. lxxvii. 126 (1939), his obvious decision at once accepted by Mansfeld in Fedde, Repert. xlvi. 286 (1939) and by Wallace and Wilmott in Bot. Soc. Exch. Cl. Brit. Isl. Rep. xii. 253 (1942).

Briefly the case is this. The generico-specific name *Rosea*, coming from the apothecaries' *Rosea radix* or *Rhodia radix* (because of the fragrance of the bruised root), was formally taken up as of Rivinius in Ruppius, Fl. Jen. 80 (1718) and was used as a definite generic name by Kramer, Tent. Bot. 19 (1744). Linnaeus, Crit. Bot. 41 (1737) and Fl. Lapp. 304 (1737) replaced

"*Rosea.* Rupp. jen. I. p. 80" by *Rhodiola* and in Sp. Pl. 1035 (1753), adopting binomial nomenclature, called the plant *Rhodiola Rosea.* When the combination *Sedum roseum* was published by Scopoli (1772), the latter author did not grasp the fact that "*Rosea*" was an old generic name. Sprague argues that, Scopoli having mistaken it for an adjective, the plant "may, however, be cited as *Sedum Rosea* (L.) Scop., since the gender of a specific epithet may be corrected without changing the authority for the binary combination concerned." Sprague, it would seem, was too anxious to give Scopoli the credit. Since the basic *Rosea* was a noun in apposition, while *roseum* was an adjective, they can hardly be considered as the same word. The combination, I think, should stand as *Sedum Rosea* (L.) Scop. ex Sprague, l. c.

This binomial presents an interesting case for those self-styled "progressives" and standardizers (who are never progressive) who would destroy the clues to origins of specific names by uniformly decapitalizing them all. If they decapitalize *Rosea* and make it look like a feminine adjective (which it is not) they appear uninformed as to the gender of *Sedum;* if they insist on *Sedum roseum* they wholly misrepresent the truth. As L. H. Bailey, always looked upon as most truly progressive, well says: "A binomial is more than a name for a plant. It has history and significance. If decapitalization obscures this significance then it should be applied with caution. One who disregards the meanings is not sensitive to words, and he may deprive nomenclature of one of its interesting assets."—Bailey, Gent. Herb. vii. 171 (1946). He further says: "There is . . . no sense in [decapitalized] *Polygonum convolvulus, Daphne mezereum, Convolvulus soldanella, Acacia julibrissin, Jatropha manihot, Brassica pe-tsui, Phaseolus mungo, Psoralea onobrychis, Zea mays*" (Bailey, p. 172). All this was clearly understood by Linnaeus, Lamarck, Willdenow, the DeCandolles, the Hookers, Eichler, Kunth, Torrey, Gray, Engler and countless others (even Britton, Rydberg, and Small, in many ways radical rather than progressive), who have initiated real progress in the science, although, before doing so, they did not announce themselves as "progressives". They were truly progressive because their work demonstrated them to be so and because they had real respect for established

good usage and understanding of words. One is not a progressive merely by adopting that misused term as a mask for intellectual inertia or lack of linguistic insight, any more than the self-appointed candidate for political office is a statesman simply by so labelling himself. Some of the younger "progressives" who adopt that unearned tag and who often remind one of George W. Cable's creole boy who was called Crabiche because he made progress backwardly, would do well, if they are not superior to being instructed, to read and digest the whole discussion on "*Species-names with capital letters*" (Bailey, l. c. 168–174) by the always progressive dean of us all.—M. L. FERNALD.

THE OCCURRENCE OF ELEOCHARIS NITIDA IN THE LAKE SUPERIOR REGION

OLGA LAKELA

Eleocharis nitida Fernald, hitherto known from Newfoundland, Nova Scotia, Quebec and northern New Hampshire, appears to have a wide range in the Lake Superior region. In the interior it was first discovered in Superior, Wisconsin, by Dr. John W. Thomson, Jr., who sent a specimen to the writer. According to information on the label, the plants were growing in a wet area south of 920 N. 22nd St. "Cultivated in 1936," must refer to the site of the colony.

After this discovery, one could hardly suppress hopes of finding the species on the Duluth side of the extensive waterfront. However, in Minnesota, its occurrence was first known to the late Dr. F. K. Butters who, with Dr. Ernst Abbe, without knowledge of the Wisconsin plants, collected the species in August, 1944, near Tofte, Cook Co. Thus, the two known sites were some hundred miles apart. The occurrence of the plant somewhere between the terminal points of its known range seemed probable.

On July 13, 1946, the writer made an effort to study *E. nitida* in the known colony near Tofte. As the North Shore Highway 61 enters Cook Co., the upper side of the road becomes springy and there are long stretches of the ditch-bottom under shallow water or, in places, deep water with marshy aspect. Frequent

stops were made to observe such areas from the county line to Tofte, and *Eleocharis nitida* was found in several localities. It seems to thrive best in wet soil or in shallow water in more or less bare areas. It is absent from deeper marshy spots under dense vegetation. Collection no. 6406 was made from a colony growing in a springy area on Highway 61, in Cook Co., about 2 mi. from the Lake Co. line. Associated with it grow various species of *Juncus*, *Scirpus* and *Carex*. Of the last named, herewith are mentioned species least frequently encountered in Minnesota: namely, *C. livida* (Wahlenb.) Willd., observed in two colonies near Schroeder; *C. Michauxiana* Boeckl., a single colony in the same locality. More frequent were *C. Vahlii* Schkuhr, and *C. flava* L.

At least one locality in Lake Co. was found favorable for *Eleocharis nitida*, a springy area near the southwest end of Pork Bay bridge. The fine clayey loam at the site of the colony was pitted by borings of *Philohela minor* (Gmelin). Collection no. 6396 was made from the colony established in bare spots of the ditch-bottom.

The North Shore area in St. Louis Co. has been collected rather thoroughly by the writer during the past ten years. However, a few localities needed re-checking, especially the sides of Highway 61, about one mile from Lake Co. line. Thus, on July 21, 1946, in a springy spot of the roadside, about 17 miles from Duluth, a colony of *E. nitida* was located. Collection nos. 6520 and 6521 were made at this area. The highway from this point passes over a wooded hill and Lake Superior shore lies some hundred feet below. Toward the southeast along the Stony Point Shore Drive, the lake shore is low, with shallow marshy pools subjected to wave action during high winds. Two small creeks emerge from a thicket, to enter into the lake. In the bare soil of the creek-mouths, among boulders, and in the moss-lined shore pools *E. nitida* occurs with *E. acicularis*. This Lake Superior shore station is less than one-half mile across the rising land from the colony on Highway 61. Collections nos. 6524 and 6798 were made at this site. Thus, its occurrence in several localities indicates a wide interior distribution.

Duluth State Teachers College

Fruits of Trees.—We have received for review a 50-page pamphlet from a specialist on trees who, perhaps, is not familiar with the standards expected by those who write reviews for Rhodora; for its use or failure correctly to use commas, hyphens and other simple marks of punctuation indicate that it is not Latin alone which is too much ignored in American education. The pamphlet is "Fruit Key to Northeastern Trees *By William M. Harlow, PH.D. Associate Professor of Wood Technology New York State College of Forestry Syracuse, New York*".[1] The very attractive illustrations are taken from an earlier volume by the author and, made from photographs, are gratifyingly accurate ("the camera tells the truth"). The text is intended for students of forestry, who seem to be assumed to need very elementary instruction, so that nontechnical words are strained after and even very simple ones defined. Throughout the pamphlet the rigid exclusion of leaves and other very conspicuous organs and the use of fruits alone lead to the separation of obviously different trees by less evident characters. For instance, Tulip-tree or "Yellowpoplar *Liriodendron*" is easily distinguished by habit, foliage and flower from "Balsam Fir *Abies*" but here, through the permutations of the Key they come side-by-side and can be told apart only by their fruit. Again, the genera *Tsuga* and *Picea* (both evergreen, so that the characteristic foliage is present with the cones) are strikingly different: *Tsuga* with the blunt and strongly flattened leaves submembranaceous, and with a slender petiole, scattered and turned into a flat spray; *Picea* with somewhat pungent, 4-angled firm leaves spirally arranged and not forming a flat spray, jointed at base to the prominent and persistent pulvini. Nevertheless, here is the only separation given for these very definite genera (p. 22):

"19. Cones purplish at maturity [with footnote explaining that "They lose this color during the winter", a correct statement, for they then become brown], scales with evident ragged edges—Black Spruce *Picea mariana*

. . . .

19. Cones brownish at maturity, scale edges smooth or very slightly ragged", this section containing two other species of *Picea* and the one of *Tsuga*, separated by their cones only.

Standardized Plant Names has evidently been the standard for "common" names. Whether even that presumptuous model had so many inconsistencies I have not attempted to check. Here we find (p. 18) "Eastern Redcedar or Redcedar Juniper *Juniperus virginiana*", followed by "Southern or Atlantic whitecedar *Chamaecyparis thyoides*"; on p. 22 and 23 "Black Spruce" followed by "white spruce"; on p. 25 "Red Maple" and "Norway maple"; on p. 26 the almost unequaled "Treeofheaven or Chinese-sumac"; on p. 28 "American elm", "Cork or Rock Elm" and "Slippery elm"; and on p. 29 "Papermulberry", "Red Mulberry" and "white Mulberry".

These items are sufficient to indicate that, either foresters are relatively naïve and not too critical (and if traits of accuracy or inaccuracy carry over into different fields their work should be carefully watched), or that the author would have done well to hand his manuscript to a pupil in the grammar-school (if any of them are now taught the simple rudiments of grammar and rhetoric) for editing before it went to the printer.—M. L. F.

[1]Published by the author, 234 Kensington Pl., Syracuse, N. Y.; single copies 50c; 10 or more copies less 20%.

Centaurea maculosa in Illinois.—Within the past year this species has been reported from Michigan by E. E. Sherff[1] and from Indiana by E. D. Hull[2], hence its recent detection in two of the northern counties of Illinois is not at all surprising. The discovery of the spotted knapweed in 1945, by Dr. E. W. Fell of Rockford, brings the total number of centaureas now known in this state to seven, the others being *C. calcitrapa* L., *C. cyanus* L., *C. jacea* L., *C. nigra* L., *C. solstitialis* L. and *C. vochinensis* Bernh. The following specimens of *C. maculosa* L. are in the herbarium of the Illinois State Museum at Springfield, and through the courtesy of the curator, Professor Geo. D. Fuller, duplicates have been deposited in the herbarium of the University of Illinois. The collection-data are as follows:

Illinois: roadside, generally scattered over the county, three miles south of Rockford, Winnebago County, July 30, 1945, *E. W. Fell* No. 45485; roadside, three miles southeast of Cherry Valley, September 27, 1945, *E. W. Fell*, No. 45743.—George Neville Jones, University of Illinois.

[1] Rhodora **48**: 98 (1946).
[2] Op. cit. 391.

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Photo. I. D. Clement

Sagittaria planipes, all figs. from type: fig. 1, plant, × ½; fig. 2, bract, × 10; figs. 3 and 4, broad and narrow sides of pedicel, × 10; fig. 5, anthers, × 10; fig. 6, achene, × 10.

S. latifolia, var. obtusa: fig. 7, bract, × 10; fig. 8, anthers, × 10.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXIII

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. Fernald

(Plates 1056–1085)

Part I. Three short Trips to Southeastern Virginia

As soon as gasoline became available in 1945 Mr. Bayard Long and I returned to our center at Waverly, Virginia, anxious to do some autumnal exploring of the ponds of Sussex and Southampton Counties which we had seen together only in the early summer of 1943 and then at the last moments of a trip which had to be our last one for more than two years. Many species, accredited to southeastern Virginia for a century to a century and a half but without known vouchers, were on our minds; and we were determined, now that we had found some ponds with broad sandy or peaty beaches and extensive swales (only a few miles from the Southampton headquarters of Frederick Pursh, at Dr. Edwin Gray's near Sebrell), to gather them where presumably Pursh had found them, for some, though not all, of the unverified records started with Pursh in 1814, a few going farther back and a few starting with Torrey & Gray or with early editions of Gray's Manual. We had for years hunted in vain in moist pine-barrens or damp peaty or sandy pockets for *Bartonia verna*[1], which Pursh had recorded from "mossy swamps: Virginia to Georgia";

[1] As in preceding papers of this Virginia series, authors of names which are in Gray's Manual, ed. 7, are omitted.

and records of other plants of sands or sandy barrens, like *Syngonanthus flavidulus* and *Kalmia hirsuta*, still haunted us. These, however, were spring- or early summer-flowering species. We had now set our hearts on at last retrieving from the peaty pond-margins such obvious desiderata as *Mayaca Aubleti* and *Balduina uniflora*, the latter described by Nuttall in 1818 from "open grassy swamps from the maritime parts of Virginia to Florida". The *Balduina*, of course, might be back in the savanna-like swales which at least one member of the party had hopefully visualized as there, if anywhere, associated with other Virginian "spooks" like *Dichromena latifolia, Juncus polycephalus, Oxypolis filiformis* and *Baccharis glomeruliflora*. And we hoped at last to find Pursh's own station (supported by a specimen at the Philadelphia Academy) for *Litsea*, to say nothing of the always evasive but magnificent evergreen tree, *Gordonia*. These and other reputed Virginians were on our minds, as they had been for several years, and, now that we actually knew of appropriate pond-margins near where Pursh had resided, we were buoyant with hope.

But, alas, excessive rains of late summer had flooded the ponds; the shores of most of them were completely drowned. Only a very narrow and soaking-wet margin of a few feet (instead of 50–100 or more) showed, where the water had receded at Airfield Pond. Following the northeastern margin, which we had slightly explored in early July of 1943, we found nothing new. The bushy swale at the head of the first cove was a typical *Cephalanthus*-swamp, with herbaceous vegetation of the commonest and most aggressive species, such as *Rhynchospora glomerata* or *Xyris caroliniana* and *X. ambigua* Beyrich. If any rarity ever occurred there it would have been crowded out by *Cephalanthus* and its jostling associates. So, going to the southern shore of the pond, we climbed over the inevitable fenced-in hog-wallow, to follow the little belt of exposed shore. Immediately the excitement began. Standing up out of the continuous carpet of *Drosera capillaris* Poir. we promptly saw the beautifully distinct but relatively common *Gentiana Catesbaei* Walt. (see PLATES 1078 and 1079). Growing with it was the white (when dry saffron)-flowered *Sabatia difformis* (L.) Druce, a characteristic species new to Virginia. In 1943, on the northeastern shore of

Airfield we had found only a single small colony of *Rhynchospora filifolia* Torr. at the first station between southeastern North Carolina and those famous havens of isolated southern plants, Sussex County, Delaware, and Cape May, New Jersey. Here, on the southern shore, it was dominant. Associated with it was *Eriocaulon decangulare,* a very local species in Virginia but here abundant; and *Hypericum,* § *Brathys* threw us into despair. Almost everywhere was typical *H. canadense* of all sizes up to 6 dm. high, while more or less alternating and broader-leaved plants with few or aborted fruits, the plants reaching a height of 7.5 dm., abounded. Although broader-leaved, this could not be the northern *H. majus.* It goes into the heteromorphic series called *H. dissimulatum* Bicknell (surely well named), that half-sterile bunch which northward seems like polymorphous progeny of *H. canadense* crossed with either *H. boreale* or *H. mutilum.* Here *H. boreale* was out of the question and, although *H. mutilum* is in the neighborhood, we did not specially note it at Airfield Pond. The plant there which most interested us, however, was a tiny little leaning or half-reclining *Hypericum* with short-petioled obovate to oblanceolate leaves, a slender plant which an hour or so earlier we had been puzzling over in a pocket of deep *Sphagnum* a little farther north. This weak and slender plant, strongly suggesting attenuated *Galium trifidum* or *G. tinctorium,* occupied a few mossy carpets quite by itself. It is later described, and illustrated in PLATE 1076.

Near the mossy and peaty pockets of the new *Hypericum* was *Scleria Muhlenbergii* Steud.[1], a nice species but a bit disappointing, for we hoped, in this habitat, so like many pond-shores of the Carolinas, southern New Jersey, Long Island and southeastern Massachusetts, to get its close relative, *S. reticularis,* which occurs from Florida to southeastern South Carolina, thence seeming to "jump" to Delaware but occurring rather generally from there to eastern Massachusetts. We hunted for other species which occur in Georgia or South or North Carolina but are unknown between there and Delaware or southern New Jersey, but mostly in vain. In a few mossy pockets, however, one of them suddenly appeared, *Psilocarya nitens,* a very neat species, heretofore unknown from between the famous Wilmington region of south-

[1] See Fernald in RHODORA, xlv. 296, 297 (1943).

eastern North Carolina and Cape May, New Jersey but local about ponds of Long Island, with an isolated northeastern outlier on a single pond in Plymouth, Massachusetts, and, like several other Coastal Plain species, an isolated colony in northwestern Indiana. That was the sort of plant we were looking for but we were unprepared for the next discovery. Very near the *Psilocarya*, in semi-open peaty and sandy spots, there was a tiny *Xyris*, making little whitish-green tufts only 2 or 3 cm. across. Its filiform scapes suggested *X. Curtissii* Malme, but instead of being a cespitose blue-green perennial with many scapes, as is the latter species, the little plant of Airfield Pond was an annual, with mostly solitary scapes and different sepals and seeds. It proves to be the most northern member of the chiefly tropical *Xyris*, § *Brevifoliae*. I have already described and illustrated *X. Bayardi* in Rhodora, xlviii. 56, plate 1007 (1946). The insignificant belt of sand and peat exposed at the margin of Airfield Pond was really very significant and had well justified our faith in the locality, but *Mayaca, Balduina, Dichromena latifolia, Oxypolis filiformis* and the other reputed Virginians still remained on the doubtful list. For a moment I thought I saw *Mayaca* but only for a moment. The wet peat was carpeted right down to the water with very loosely leafy and prolonged, flexuous, creeping and writhing stems of the most diffuse extreme of *Lycopodium inundatum*, var. *Bigelovii* Tuckerm.[1] These sterile and lax strands up to 4 dm. long and with leaves up to 1 cm. long so closely resemble the long creeping stems of *Mayaca fluviatilis* Aublet, which comes north into southeastern North Carolina, that, at a distance of a few feet, herbarium sheets of the two are indistinguishable. As I suggest in Part II, it is a temptation to imagine that Pursh's record of *Mayaca* from Virginia could easily have been based on such loose-growing sterile plants of the *Lycopodium*.

More rain quickly drowned the temporary narrow beach of Airfield, and every pond we visited was quite without exposed shore. So we soon started out on days of mere exploration, making our way to several ponds, that we might sometime, when the water is low, know which to revisit. There are a full one hundred of them on the Coastal Plain of southeastern Virginia

[1] See Rhodora, xlviii. 136 (1946).

and it was important to learn how to reach them. One which lies to the north of Airfield Pond, but which is at the head of a branch flowing into Brittle's, seemed worth finding. When we showed the contour-sheet to some colored boys they said: "Oh, that's Jenkins Pond." Driving along the road we were puzzled as to which farm-road to take; so, seeing a farmer at work, we asked how to reach Jenkins Pond, receiving the prompt reply: "Never heard of it. There's a pond back of my barn which might interest you. Just drive up to the house and leave your car. My name is Jenkins." We have called this promising pond "Jenkins Pond." We remembered a tempting piece of *Sphagnum*-carpeted woods not far from Brittle's Pond where, in July of 1943, we had seen interesting plants. At this season the most interesting discovery was the *Galium*-like *Hypericum* already discussed; and, since such spring-fed sphagnous woods often contain the primitive and rare *Carex Collinsii* Nutt., we watched for it, although June would have been the proper season. There it was, mixed with the long misinterpreted *Agrostis altissima* (Walt.) Tuckerm., which I shall discuss in Part II. At the margin of these woods we established a new eastern limit for *Lobelia georgiana* McVaugh (*L. glandulifera* (Gray) Small). Nearby, the drier woods yielded a very handsome and quite distinctive *Desmodium*, one of Dr. Schubert's species, the name not yet published by her. A mile or so north of Waverly, along a wood-road near a now drained pond, we were delighted to find a good colony of the recently described *Eupatorium cordigerum* Fern. in RHODORA, xlvii. 192, plate 908 (1945); and near it was a great clump of a puzzling *Solidago*. This has been described and illustrated as × *S. hirtipes* Fern. in RHODORA, xlviii. 65, plate 1011 (1946).

The ponds being over-full and their shores inaccessible, the obvious thing to do was to explore the fresh reed-marshes along the tidal rivers. Fortunately our friend Calvin Horne had his outboard-motor still mounted on a trailer after a vacation on the lower James; so with him or his substitute we returned to the usually productive reed-marshes of the lower Northwest River in southern Norfolk County and similar marshes of Blackwater Creek in southern Princess Anne County. These very extensive reed-marshes, with coarse grasses, sedges, *Typha*, and tall *Com-*

positae high above one's head, these interspersed with the incomparably tough and stabbing "Blaspheme-vine", *Smilax laurifolia*, or with tall masses of Sawgrass, *Cladium jamaicense*, with its hard and elongate leaves fringed by coarse saw-teeth, are not the places for picnics or for the mere seeker for pretty flowers. Finding a possible landing-spot, one wallows and tumbles into the back of the marsh through almost impassible barriers and when nearly exhausted makes his way back to the boat. Three or four such landings in a day were all we two oldish but somewhat experienced botanists could stand. In view of the facts that almost every landing (perhaps a fourth of a mile apart) often yields something else and that about a quarter of Princess Anne County consists of such marshes (with Norfolk County a good second) the future work for a new generation is impressive. At one point or another these fresh marshes or their borders and pools are occupied by such local species, then known from only one station in Virginia, as *Phalaris caroliniana* Walt., *Scirpus etuberculatus*, *Eleocharis radicans* (Poir.) Kunth, *Lilaeopsis carolinensis* C. & R., *Pluchea purpurascens* (Sw.) DC., *Aster Elliottii* T. & G., etc., etc.; while only 2 or 3 stations are known for many others: *Juncus megacephalus*, *Dichromena colorata*, *Ludwigia alata*, *Verbena scabra* Vahl, etc., etc. So we attempted to do our bit, but these two areas, not far from the bridges, had been well searched before, Northwest an old collecting-ground of Heller, Kearney and ourselves, and Blackwater Bridge much visited also. *Ludwigia alata* was added to the specialities of Northwest and the almost smooth estuarine *Polygonum sagittatum* var. *gracilentum* Fern., mingling with true plump-fruited *P. arifolium*, which seems to specialize on estuaries, was extended south from the marshes of the Chickahominy. *Aster Elliottii* was found to be rather general on the marshes; and at the type-locality, Northwest, of *Lobelia elongata* Small we found some overgrown plants with branching inflorescences. But we soon became absorbed with *Spartina cynosuroides*, for it suddenly struck us that the loosely racemose inflorescences with definitely peduncled spikes, which abounded in these marshes, belonged to a very different plant from the one on real salt-marsh, in which the inflorescence is denser and with many more closely crowded and appressed spikes. We resolved to get real rhizomes and stolons,

for most herbaria lack them. If others have attempted that feat they will know that it may take an hour of hard pickaxing to extract complete rhizomes and stolons from the dense and slimy substratum. After one was secured for me there must be one for Long; then a few duplicates! This plant of fresh to merely brackish tidal marshes was again dug on similar reed-marshes of Gray's Creek, well up the James above salt water. This subject will be further analyzed in Part II.

In June of 1946 Long, unfortunately, was unable to join Dr. H. Emery Moore, Jr., and me for a trip, June 3–15, but perhaps he was really fortunate in avoiding possible infection. When we left Cambridge Moore was feeling "miserable" and, as we proceeded, it was evident that he was urging himself to drive; eventually weakened and nearly prostrated by intestinal 'flu. Nevertheless, he hung on gamely until the doctor interfered, ordered him to bed and prescribed a starvation-diet. Naturally the first duty was to get at the ponds. It had rained heavily through May and we were told that the pond-shores were flooded. Consequently, when we first spied Airfield, I thought we had taken the wrong road. There wasn't any pond there, merely a great shallow and peaty basin more than a mile long, with scattered small pools. But it was Airfield, after the breaking of the dam in winter. The bottom, as far out as we cared to walk, was a solid turf of the usually perennial *Eleocharis obtusa*, var. *ellipsoidalis* Fern. in fruit, a perennial which had sprung up and was heavily fruiting in a few months! The usual array of *Rhynchospora, Carex, Panicum* and other shore-plants luxuriated, but the upper margin of the pond showed nothing new. The dam of Whitefield Pond, southwest of Corinth Church, had, unhappily for us, stayed damnably intact and the heavy rains had been thoroughly impounded, so that botanizing became deep wading (up to our waists). Immediately we were challenged by the great variation in the fruit of the Water-Ash, *Fraxinus caroliniana*. Some shrubs had the fruit purplish, others pale or yellowish, some had the young shoots and the lower leaf-surfaces glabrous, others softly velvety or pilose; but those variations were merely formal. More significant was the shape of the fruit, rhombic, ellipsoid or oblanceolate, broadly rounded at summit or attenuate, flat, spoon-shaped or 3-angled. From that first day

throughout the trip this baffling series held our attention. Whether it will be sufficiently studied for further consideration in this paper is doubtful, since it is necessary to get further data on some old types within the genus. Very soon we got into a great clump of high-doming blackberry, gigantic shrubs with only a few prickles but with intricately forking and flexible branchlets 2 m. long and arching over to the ground. This was a stranger which will be described and illustrated (PLATES 1067–1069) in Part II; but it merely started us on the inevitable series of novel *Rubi*. At one point *Itea virginica* did not look natural. In fact, I thought we had extended northward the range of *Fothergilla parvifolia* Kearney, the little compact inflorescences were so strikingly suggestive of *Fothergilla*. The clump is, however, the type of *Itea virginica*, forma *abbreviata* Fern. in RHODORA, xliv. 22 (1947). Only at one point, close to the dam, was there evident a bit of exposed beach; but that was definitely worth while, for there, tangled with the now very familiar but locally endemic *Eryngium prostratum*, var. *disjunctum* Fern. in RHODORA, xlvii. 163, plates 897 and 898 (1945), was a neat little colony of *Ludwigia brevipes* (Long) Eames, a species we had known only from damp sands nearer the outer coast, the most inland station known having been at the Cat Ponds in eastern Isle of Wight County. These few specialities, added to *Polygonum hydropiperoides*, var. *euronotorum* Fern. in RHODORA, l. c. 137, plate 884 (1945), all on a few rods of shore, certainly mean that some dry summer Whitefield Pond is going to give us some more surprises.

Having an errand which required driving to Petersburg, we started northwestward from Waverly, but when we reached the very wet (then almost pond-like) depression in the pinelands only 3 or 4 miles from Waverly we stopped to get any lingering flowers of *Iris prismatica* which abounds there. While we were gathering these last flowering specimens I was impressed by the trailing dewberry which occupied the wet hollow. This was not the right habitat for ordinary xerophytic and glabrous-leaved *Rubus flagellaris*, and examination showed that this swamp-plant had the leaves soft-pubescent beneath. It was, obviously, not that species. Subsequently, in September, Long and I got supplementary material and then found it occupying a similar wet and swaley habitat several miles away. Differing from *R. flagellaris*

in several additional characters, this trailer of wet pineland will be described in Part II and shown in PLATES 1064–1066. In this boggy hollow, the home of *Aletris aurea, Tofieldia racemosa, Zigadenus glaberrimus* and *Carex Barrattii* Schwein. & Torr., the low and narrow-leaved *Viburnum nudum,* var. *angustifolium* Torr. & Gray was abundant in its almost extreme development, flowering but only 3 or 4 feet high, although later on we found it fully mature and only 1½ feet high.

At New Bohemia we varied the route by leaving the 4-lane turnpike and taking a cross-road toward the Jerusalem Plank Road, in order to pass through unspoiled woodland and clearings; but we got only a short distance when we halted for an abundant goldenrod, in full bloom in the first week of June (obviously having begun flowering late in May). Immediately thinking of *Solidago verna* M. A. Curtis, which flowers in southeastern North Carolina from earliest May to early June, we set to work on the large colony. It obviously was not *S. verna* but was so like the midsummer and autumnal *S. juncea* of northern, inland, and (southward) upland range as to baffle us. It proves to be a vernal-flowering Coastal Plain extreme of *S. juncea,* differing from it in smaller involucres with vividly green (instead of yellowish) phyllaries and shorter ligules, disk-corollas, pappus and achenes. This fine new goldenrod, to be described in Part II, ended the morning's collecting. Later in the day, trailing old specialties, we brought up at the little sphagnous bog near Dahlia, the home of so many rarities. For purely sentimental reasons I make it a point to look in there occasionally, although we now find nothing new. In fact, the encroachment by the farmer, whose plowed acreage, ditching and hogs continue to invade the bog, is bound to destroy some of the specialities. Not so one of them, which a few years ago was represented by only a few small plants. Repeated and chronically southern burning off of the bog has stimulated *Zigadenus densus* (Desr.) Fern. at its only known Virginia station, so that the greatly increased colony now bears inflorescences four times the recorded size, some of them branching and paniculate, instead of simply racemose!

While stationed at Norfolk during the war, Mr. Leslie Hubricht of Detroit had written me of some of his botanical finds and on returning to Detroit he sent me specifications of the three

most natural and undisturbed spots he had found in his occasional botanizing trips. These were all near Suffolk. One of them had been familiar to Long and me, the type-region of *Malaxis Bayardi* Fern. in Rhodora, xxxviii. 402, fig. 1 and pl. 446, figs. 1 and 2 (1936); the others were unknown to us. So one day Moore and I started out to look into them. The first, a tiny bit of sphagnous bog west of Kilby, along the Norfolk and Western Railway, was quickly found, recognized from the path on the railroad-embankment by the upstanding yellowish trumpets of *Sarracenia flava*, always a good indicator. In early June such bogs are only beginning to show their real treasures but even then the richness of the spot in localized plants was apparent. *Scleria minor* (Britt.) Stone, a denizen of sphagnous bogs, was there, again a good indicator, and the thick corm-like bases and foliage nearby indicated *Aster gracilis*. Here, too, was *Scutellaria integrifolia*, var. *hispida* Benth., at its third known station so far north. Best of all, at the western border of the bog we walked into the second Virginian station for the very rare southern *Sisyrinchium capillare* Bicknell, already in mature and opening fruit. These were only mild suggestions of what the September visit would yield.

The borders of the Great Dismal Swamp, traversed by trunk-roads, always yield surprises. So, passing Suffolk, en route to the tidal marshes of Northwest River, we had passed Magnolia when, curious about the very large *Anthoxanthum odoratum* (up to 1 m. high and with interrupted inflorescences nearly 1.5 dm. long), which deliciously scented the roadside atmosphere, I got out to investigate. The grass was interesting enough, forma *giganteum* P. Junge, which I had never seen. But, before returning to the car, I became puzzled by the water-lily which filled the seemingly shallow but, when entered, pretty deep peat-bottomed pools. The flowers were all wrong; standing erect some inches above the floating leaves, both sepals and petals narrowly lance-attenuate, the sepals reflexed and pointing down to the water. This was quite new to our experience, so Moore, although feeling pretty groggy, wanted to take a kodachrome-picture of it with the old man as a scale. In labeling this photograph he displayed his emotions at the time, for he called it "Water-nymphs in the G. D. Swamp" (plate 1061). The plant is so distinct that it will be described and illustrated (plates 1061–1063) in Part II.

Not far from Magnolia there was a trailing *Rubus* which I had never met, merely *R. celer* Bailey, its range extended southward from Arlington and Fairfax Counties. But the next two *Rubi* represented not merely range-extensions. In the very wet and perpetually inundated margin of the Great Dismal Swamp, near Wallaceton, there was a strange relative of *R. cuneifolius*, which is xerophytic. This shrub, in the wettest of habitats, looked unfamiliar. It proves to be a novelty, described and figured (PLATES 1070 and 1071) in Part II, its nearest ally apparently being *R. Humei* Bailey of Florida, said by its author to be "the only paludose species" of the section. Desiring to get really good rhizomes of *Dryopteris celsa*, which had been much on my mind since I suddenly found myself condemned to "do" the ferns for the Manual, we proceeded to the cypress-swamp along Northwest River northeast of Wallaceton to get them. There, in the shade of *Taxodium*, another and very "different" *Rubus* blocked our path. So definitely not of the ordinary run and occupying so distinctive a habitat, it had to be collected. In September, when Clement was with Long and me, we found it characteristic of other cypress-swamps up to 50 miles away. It has a real range and definite habitat; so I am forced to describe and illustrate it (PLATES 1072–1074) in Part II. The reed-marshes at Northwest and at Blackwater failed to yield any real novelties, though at Northwest the marsh had *Carex Mitchelliana* M. A. Curtis of fresh habitats mingling its roots with those of the usually extreme halophyte, *Scirpus Olneyi!* Southeast of Blackwater, at Pellitory Point along Back Bay, almost in North Carolina, *Carex hormathodes* abounded, its previous southern limit in the tidal marshes of the James. It may now be looked for on Currituck Sound in North Carolina.

In September of 1946 (5th to 18th) my student, Ian D. Clement, drove Long and me to Virginia, our new headquarters being in a very comfortable cabin at the Virginia Diner in Wakefield. Airfield Pond had pretty well filled after the repairing of its dam and we got nothing not seen the year before, although several species, *Sabatia difformis* and some others, were more abundant, while the draining of the pond seemed to have put a temporary check upon others. Whitefield Pond was still overflowing but we got better material of some of the June specialities

at the only bit of beach exposed, and began the collecting of *Eleocharis vivipara* Link, a southern species heretofore known in the state only from near Cape Henry but from our first day to the last now repeatedly appearing about the ponds from Southampton to Princess Anne.

One of the localities indicated to us by Mr. Hubricht as almost unique in southeastern Virginia, in being rich woods with the deep carpet of leafmold undisturbed (instead of scraped down to the underlying clay or sand for use on the truck-farms) was near a most unpromising tangle of railroads, sidings, abandoned roads and dumps just to the east of Suffolk. We looked askance at the abandoned dirt-road he indicated on his map but, after trying others, came back to it and in one minute were at the margin of a fine piece of oak-hickory woods, bordered on one side by a dump of broken glass and rubbish, on another by an old field, on a third by a railroad. Starting in at the upper edge of the woods we promptly came to a small branch bordered by the rare *Chelone obliqua;* then the largest colony we had ever imagined, mostly in fruit, of *Hexalectris*, which always means good soil; then *Sanicula Smallii* Bicknell at a new eastern limit. With them were other good things but we were most interested in a strange *Desmodium*, one we did not remember having seen and which Dr. Schubert (at the moment of this writing studying and photographing at Geneva the types of the *Desmodia* described in De Candolle's Prodromus) assures us is undescribed. Trying to get rooting specimens, we followed the horizontal roots by cutting away hickory- and oak-roots and eventually landed complete roots. The fruiting stem arose from a sweet-potato-like enlargement which terminated a long filiform root, fringed with tubercle-bearing rootlets, and itself terminated by a slender "sweet-potato". We had started something! Coming up from the woods to a fallen log we quickly disposed of lunch and then rested for an hour or two by digging out root-systems of *Desmodium viridiflorum*, *paniculatum* and *nudiflorum*, each very distinctive. The die was cast; there was no turning back. Every species of *Desmodium* we came to after that must be dug. *D. lineatum* of dry pineland had a stout tap-root descending vertically through a mesh of oak- and pine-roots, so that it was necessary to cut out a broad pit a foot and a half deep and even then to miss the tip.

Then a second one must be dug, that both Long and I might each have one. *D. pauciflorum* of rich woodland loam has filiform, horizontal roots ending in tubers resembling small peanuts. In fact, if one really wants to distinguish the species of *Desmodium* he should know the roots! One plant can be dug, on the average, in half-an-hour to an hour. I am not making a key to the species wholly dependent on the roots. There are many which we do not yet know. It is going to be interesting, for instance, to see what sphagnicolous *D. tenuifolium* T. & G. has for roots. Dr. Schubert, furthermore, is in the midst of a monograph of the genus in North America. She has been working with bracts, calyx, articles (segments of loment), leaves and such superficial characters. We are merely trying to do our little part by helping her get at the root of her problem!

Clement, absorbed in the intricacies of *Sida*, was anxious to see the type-colony of *S. inflexa* Fern. in Rhodora, xlii. 463, pl. 638 and 639, figs. 1–3 (1940). In his studies he has been able to show me that I had mixed two species and that *S. inflexa* is indeed an endemic species of southeastern Virginia only. The type-region is the woods along Three Creek, perhaps 2 miles above Carey Bridge over the Nottoway. The banks and very rich woods along the western side of the Nottoway there have been very productive. There has been the only actually known station for the rare and evasive true *Sphenopholis pallens*, discussed in Rhodora, l. c. 356 and 357 and again in vol. xliii. 494 and 534 (1941); and growing near it was the relatively rare *Aconitum uncinatum*, var. *acutidens* Fern. in Rhodora, xliv. 398, pl. 720, figs. 2–4 (1942). Nearby grow *Tetragonotheca helianthoides* and true southern *Polygala polygama* at one of the two known stations in Virginia, as well as numerous other rarities. As soon as we turned into the wood-road above Carey Bridge we were disheartened. The country thereabouts was being improved! Everywhere the woods were torn up and heavy bulldozers and other instruments of so-called improvement had dug away or heaped in great mounds the whole substratum nearly up to the crossing of Three Creek. The only station for *Sphenopholis pallens* was covered by many feet of earth and the preparation for a new approach to a presumably new bridge had obliterated the *Aconitum* and many more mere plants. Who cares? Fearing that *Tetragonotheca*,

the *Sida* and their local associates were also gone, we were relieved to find that these, at least, were still spared, but we do not know what may have been happening since. *Sida inflexa* was in fine form, much better than we had heretofore known it. We were thankful for that little bit.

At last (on the 8th) we got to the little bog about half-a-mile west of Kilby. Immediately the shouting began. While I was collecting one speciality or showing it to Clement, Long was calling to me to come and see what he had found. In fact, this small pocket was a regular *rhynchosporicetum*, with half the species of Virginia jostling one another, all the common species and some less common, like *R. debilis* Gale in Rhodora, xlvi. 194, pl. 826, figs. 5A and 5B (1944), *R. rariflora* (Michx.) Ell., and *R. chalarocephala* Fern. & Gale in Rhodora, xlii. 426, figs. 1 and 2 (1940); and here I began to be worried by *R. perplexa* Britton, for the spikelets were so much more crowded and so much larger than in the Florida type. From now on we collected it and in Part III shall discuss and illustrate it (plate 1060). The great show, however, was not from *Rhynchospora*. All over the bog the roseate inflorescences were abundantly supplied by the stiff spikes of *Liatris spicata*, var. *resinosa* (Nutt.) Gaiser in Rhodora, xlviii. 216 (1946), described by Nuttall from "the Pine forests of North and South Carolina", its viscid, dark purple involucres strongly contrasting with the rose-pink flowers; and the broad corymbs of *Carphephorus tomentosus* (Michx.) Torr., var. *Walteri* (Ell.) Fern. in Rhodora, xlii. 481 (1940), which had been known in Virginia only in dry pine-barrens farther inland. Earlier in the morning the rose-color would have been increased by the petals of *Rhexia mariana*, var. *purpurea* Michx. (*R. Nashii* Small) and *R. ciliosa*, both of which drop their petals too promptly for any but very early risers. Yellow was supplied by the panicles of the southern (Texas to Georgia, north to southeastern Virginia) *Solidago nemoralis*, var. *Haleana* Fern., l. c. xxxviii. 227, pl. 431, figs. 1 and 2 (1936) and by a perfectly glabrous extreme, such as we had previously found on the bog near Tom Hunter's at the southwest corner of the county, of the usually densely pilose- or villous-stemmed *S. fistulosa* (*S. pilosa* Walt., *S. villosa* Ell.), an extreme to be more formally defined in Part II. More brilliantly yellowing the upper border of the bog were the earliest expanding

heads of *Coreopsis oniscicarpa* Fern. in Rhodora xl. 472, pl. 533 and 534 (1938). Mingled with these but making less display were such nice plants of bogs or wet pine-barrens of the South as *Ctenium aromaticum*, true *Xyris flexuosa* (*arenicola* Small), *Aletris aurea*, *Paspalum praecox* Walt., var. *Curtisianum* (Steud.) Vasey, *Hypoxis micrantha* Pollard, *Desmodium tenuifolium*, *Hypericum setosum* L., *Ludwigia hirtella* and *pilosa* Walt., and *Gentiana Porphyrio* (in bud). Such a congregation of the elect certainly indicated what must have been the boggy spots when Banister or Clayton first knew southeastern Virginia, these tiny remnants of unaltered country now excessively rare. But that was not all; the good things enumerated are merely the background of the picture. Crawling on hands and knees we began to unravel the tangle; a strange little grass, suggesting *Paspalum setaceum* but with essentially glabrous foliage, to be described and illustrated in Part II (PLATE 1057); an overripe but strange *Ludwigia* which could only be the southern *L. virgata* Michx., the first known in Virginia; a *Crotalaria* quite new to us and growing in *Sphagnum*, not in dry sand, a novelty to be described later and illustrated in PLATE 1075; and almost mixed with it an utterly strange *Panicum* with sheaths and leaves gummy with black wart-like atoms, an apparently new species (PLATE 1059). When we quit near twilight we were not at all certain that we had crawled over and thoroughly investigated every square yard of the bog, but we were temporarily satisfied and, after reporting general results to our friendly hosts at Wakefield, were regularly asked at the end of each day if we had "hit the jack-pot" again.

We certainly did not again approach that day's record but another day, when we had gone hopefully to points farther north, to be somewhat disappointed, we returned to the area. On the northern side of the railroad there was a smaller piece of the bog which we had barely touched, and, reasoning that other such spots might be farther west along the unspoiled right-of-way, we tried out our theory. Less than a mile farther west there was, indeed, a small duplicate of the first bog, with many of the same specialties and with *Lachnocaulon anceps* so atypical in aspect as to raise our hopes. Best of all, here was a dwarf *Scutellaria* which proves to be *S. integrifolia*, var. *multiglandulosa* Kearney (*S. multiglandulosa* Epling), the first from north of Georgia. In the

smaller portion of the first bog some of the now familiar species had greatly developed their inflorescences in only four days and there *Lyonia ligustrina* was reduced to its lowest stature, fruiting and evidently fully developed though only 1.5–2 dm. high (see PLATE 1077). Other surprises of this and near-by areas may be held over for Part II for they would seem trivial after a boggy area which had yielded 6 plants new to science, with 2 others new to Virginia and 17 others which had been known from only 1–3 stations.

Reasoning that the various shallow and fresh ponds back of or among the dunes along the coast would have available shores at low tide and remembering many specialties of such habitats found during our earliest Virginian work, when we had a center at Virginia Beach, we decided to try them. Proceeding to Little Creek in northwestern Princess Anne, we found much of the area under military or naval restrictions; so, since all ponds were, for the moment, alike to us, we bypassed, without seeing it, Bradford Lake, a full mile long, and headed for Lake Joyce, even longer and situated south and east of Chesapeake Beach. But, driving out from the turnpike, we promptly came to a tiny nameless pond less than a quarter of a mile long and went to work. It was well on in the afternoon when we stopped to eat lunch and approaching twilight when we quit. Big Lake Joyce and Bradford Lake and smaller Chub Lake with its half-mile of bordering marshy flat, all easily accessible from Chesapeake Beach, are still unknown to us. The little pond was bordered by a turf of *Eleocharis, Juncus, Cladium mariscoides* and other such plants. *Eleocharis olivacea* and the now very familiar *E. vivipara* alternated or commingled, and growing by itself there was another, the tropical American *E. flavescens* (Poir.) Urban, heretofore known in the Manual-range only from Virginia Beach and at Cape May, New Jersey. We trampled on the continuous carpets of the usually very local *Ludwigia brevipes* as if it were a mere carpet-weed; but, kneeling down to collect some good strands of it, we stopped abruptly. The *Hypericum* was surely the northern *H. boreale,* heretofore unknown so far south except in the mountains. And the *Galium,* closely resembling *G. tinctorium* (*Claytoni*) puzzled us on account of its large fruit and very long pedicels, merely *G. tinctorium,* var. *floridanum* Wiegand, its range extended north from Florida and here mingling with *Hypericum*

boreale at its southern limit. That was pretty good, but we must look over the dune-hollows. Of course the regular plants were there: *Triplasis purpurea* more than a meter high; *Oenothera humifusa, Galium hispidulum, Lechea maritima,* var. *virginica* Hodgdon in Rhodora, xl. 109, pl. 490, fig. 9 (1938), *Diodia teres,* var. *hystricina* Fern. & Griscom in Rhodora, xxxix. 307, pl. 469, fig. 4 (1937). Here also was *Cassia nictitans,* var. *hebecarpa* Fern. l. c. xxxviii. 423, pl. 448, figs. 1–3 (1936), heretofore known in Virginia only from the sands of Northampton County. But we were especially pleased with the *Eupatorium* which abounded in the hollows. Off-hand one might pass it for *E. leucolepis* but its very thick and thumb-like tuberous roots are all wrong for the latter species. It proves to be the southeastern *E. recurvans* Small, which we had previously seen only about the Great Dismal Swamp. Starting toward Wakefield at the end of a full day, we were driving as rapidly as allowed on the broad turnpike when Long, famous for such last-moment stunts, shouted "Stop". There, in a cultivated field, was a dominating and very tall weed strange to us. It proves to be the oriental *Echinochloa stagnina* (Retz.) Beauv., apparently not previously known as naturalized in America.

Just one more locality may here be noted. Early in the summer of 1937 Long and I had found very interesting and localized plants on the sandy and peaty beach of Darden's (or Predler's) Pond, north of Courtland, but we had never been there since. We wanted to see what the autumn would show. The shore which we had formerly explored proved to have been thoroughly punched by hoofs, so, climbing across the dam, which we were sure the hogs could not do, we came to an unspoiled sand-bordered beach full of local plants. Until mid-afternoon, when empty stomachs urged us back to the car, we were studying and collecting the usual intricate series in *Eleocharis* and other technical groups, but we did not have to puzzle over the very definite *E. tricostata* at the third Virginian station, nor *Scutellaria integrifolia,* var. *multiglandulosa,* which we had been getting on the bog near Kilby. *Juncus canadensis,* var. *euroauster* Fern. in Rhodora, xlvii. 127, pl. 881, figs. 1–3 (1945) was in fine fruit, and we again wondered at the relative bigness and crowding of the spikelets of the Virginian representative of *Rhynchospora perplexa.* When we came to a diving-board, ranks of seats in the

woods, summer-cottages and evident meeting-places we turned back but another day returned to follow the beach toward the north. The little settlement proved to be a gathering-place for Boy Scouts of the state, presented and maintained by the liberal former Governor Darden. Stating our errand to the warden, we proceeded to follow up other nice plants, only three of which will here be noted. Among the ordinary broad-leaved *Cephalanthus occidentalis* of boggy thickets there were clumps with very narrow "willowy" leaves, this extreme form to be accounted for in Part II. We had been having a repetition of Moore's and my experience with *Fraxinus caroliniana*, which here showed uncanny variation in its fruit, but the tree which really delighted us was a large evergreen or semi-evergreen oak with great rounded and dense crown and drooping fruiting branchlets, which was scattered back of the beach through the woods. This was clearly the Darlington Oak, *Quercus hemisphaerica* Bartr. ex Willd., discussed and illustrated by me in Rhodora, xlviii. 137 et seq., pl. 1035 and 1036 (1946). Our previous collections had been from small trees in the gum-swamp along West Neck Creek west of Pungo in Princess Anne. Here at Darden Pond the trees are very handsome and fully grown. Returning to the car, we stopped to investigate a strange-looking *Physalis* in the sandy woods. It was not merely strange-looking; it was really so strange that it will be discussed and illustrated (plates 1080 and 1081, figs. 4 and 5) in Part II.

Thus we have again demonstrated that, in spite of almost complete clearing, settling and cultivating of many areas of southeastern Virginia, there is plenty yet to do for the botanist who knows what to avoid as ordinary, what to collect as unusual. Almost every wholly natural and unmolested spot has its isolated specialties. The great problem is to locate these spots, often so small in area as to be insignificant on a map or an aerial photograph. Only by learning the more conspicuous "indicators" and promptly following up their indications (before the plow or bulldozer gets there) can we find the last remnants of what originally must have been the most varied and numerically the largest indigenous flora in the Manual-area. Many species, found by early botanists, are apparently gone but many others, not seen by them, still linger. These we want to know about before Man has destroyed them.

Part II. Range-extensions, Range-abbreviations, Technical Notes and Descriptions

In Part II, as in previous papers of this Virginia series, I have assembled in taxonomic sequence and often with fuller discussion the principal records of range-extensions and descriptions of novelties which are noted in the diffuse narrative, as well as others not there noted. Several revisions of groups, growing partly out of the Virginia work, are noted, and, in order to assemble the Virginian specialties, several species and varieties already published elsewhere are here drawn in and in many cases indicated as additions to the flora of the state, the original collections justifying their being noted here. Several others, the status of which in Virginia has long been questionable, are also discussed, an attempt having been made to trace the sources of such records. Most of the plates, some of them of highly inartistic subjects, were prepared with her accustomed skill by Dr. Bernice G. Schubert before her departure to Europe to study and photograph hundreds of types. Most unfortunately I must humbly apologize to her for failing completely to remove some films of the almost (but not quite) transparent adhesive over numbers or other points in a few plates, these having been left with me to clean finally before they went to the engraver. Five plates, more recently made, are the work of my student, Ian D. Clement, our companion on the last September trip. The cost of the engravers' blocks has been met through an appropriation for personal research from the Department of Biology of Harvard University. For meeting the expense of their reproduction I am again indebted to my always alert companion on many botanical explorations for more than thirty years, Mr. Bayard Long. Plants thought to have been previously (except in the cases above noted) unrecorded from Virginia are indicated by an asterisk (*).

*Dryopteris Thelypteris (L.) Gray, var. pubescens (Lawson) A. R. Prince, forma suaveolens (Clute) A. R. Prince. Princess Anne County: fresh tidal reed-marsh along Blackwater Creek ("River" of contour sheet), below Blackwater, *Fernald & Long*, no. 14,870.

Very tall (up to 1.05 m.) and, in September at least, scenting the marsh with a strong coumarin-odor, suggestive of "Hay-

scented Fern". The odor not evident in the specimens after the lapse of a year.

D. Goldiana (Hook.) Gray. Surry County: lower slopes of rich calcareous wooded gullies along James River, Claremont Wharf, *Fernald & Long*, no. 8006, *Smith & Hodgdon* in Pl. Exsicc. Gray., no. 1003; rich wooded gullies along James River, below Sunken Meadow Beach, *F. & L.*, no. 8007; very abundant in rich deciduous woods 1½ miles east of Blizzard's Corner, *F. & L.*, no. 9235.

Through my failure to understand the rather definite characters which separate *Dryopteris celsa* (W. Palmer) Small, of inundated acid swamps, cypress-swamps, cypress-knees and -logs and wet woods of the southeastern Coastal Plain, from the really different *D. Goldiana* of rich (mostly calcareous) woods, chiefly northward and inland, the numbers above cited were erroneously distributed or reported as *D. celsa*. Briefly stated, the distinctions which I propose to publish in the Manual (if the rights to copyright are not endangered by someone else copying this item and himself copyrighting it first—such things happen) between *D. celsa, D. cristata* (L.) Gray, var. *Clintoniana* (D. C. Eaton) Underw., *D. Filix-mas* (L.) Schott (which comes down nearly to meet *D. Goldiana* in the North) and *D. Goldiana*, follow.

a. Lowest pinnae of fertile fronds with 10–22 pairs of definite pinnules (excluding terminal teeth or small lobes); blades lanceolate to lance-oblong, the fertile ones one fifth to half as broad as long; basal scales of stipe pale brown to fuscous, thin and scarious. . . . *b.*
  b. Lowest pinnae obviously shorter than median ones; scales of stipe pale brown to cinnamon.
    Basal scales of stipe ovate to ovate-lanceolate, 1–2 cm. long; lowest pinnae deltoid-ovate, the others broadly lanceolate; plant of swamp or wet woods, north to southern Canada. . . . . *D. cristata*, var. *Clintoniana*.
    Basal scales of stipe lance-linear and long-attenuate, 1.5–3 cm. long, mixed with shorter setiform ones; lowest pinnae lance-ovate or lanceolate, the others lance-linear; boreal upland plant. . . . . *D. Filix-mas*.
  b. Lowest pinnae nearly or quite as long as and like the median ones, all lanceolate; basal scales of stipe brown to fuscous, lance-attenuate to oblong-ovate, 0.7–1.5 cm. long; southeastern paludal species. . . . . *D. celsa*.
a. Lowest pinnae of fertile frond with (15–) 20–31 pairs of definite pinnules; blades ovate to ovate-oblong, one half to five sixths as broad as long; basal scales of stipe firm, castaneous to blackish, lustrous; plant of rich temperate woodland. . . . *D. Goldiana*.

Dryopteris Goldiana in the calcareous ravines of the lower

James thus takes its place with other upland and inland calcicolous species of the same region.

*Lycopodium complanatum L., var. flabelliforme Fernald, forma **brachypodum,** f. nov., a forma typica recedit pedunculo 0.5–1.5 cm. longo.—Sussex County, Virginia: forming a broad carpet on the sandy wooded terrace of Nottoway River, 3 miles north-northwest of Bethel Church, September 9, 1946, *Fernald, Long & Clement,* no. 15,171.

Forma *brachypodum,* which forms a large mat where we found it, was only sparsely fruiting. It strongly contrasts with the usual and typical var. *flabelliforme* in having the common peduncle so short as to appear, without close examination, to be wanting, the peduncle in var. *flabelliforme* usually being very evident, 3–11 cm. long.

Potamogeton diversifolius Raf. When I treated this species in Mem. Am. Acad. xvii, pt. 1, 105–108 (1932) I had seen it from only one station in southeastern Virginia, that in Princess Anne County. It proves to be generally distributed from Northampton and Princess Anne Counties inland to Henrico, Dinwiddie and Greensville Counties.

Najas in the Virginian Estuaries.—In Rhodora, xliii. 527 (1941) I wrote, in discussing some of the estuarine plants of southeastern Virginia: "As if it were not enough, for an estuary already 'worked out', *Najas* at low tide began to upset our calculations. The material secured belongs to three species. Before they can be satisfactorily settled additional collections, especially at a later season, must be secured." More material has been collected but I find myself still puzzled as to exact identities. I have tentatively placed them in the three generally recognized eastern species, but close study by one more familiar with the technical characters is likely to lead to readjustment.

*?Najas flexilis (Willd.) Rostk. Plants temporarily so identified are from two river-systems. King William County: fresh tidal margin of Mattaponi River, northwest of King William Courthouse, *Fernald & Long,* no. 12,520. New Kent County: fresh tidal marsh by Chickahominy River at "Shady Rest", southeast of Windsor Shades (Boulevard Post Office), *Fernald & Long,* no. 12,523. Charles City County: fresh tidal margin of Chickahominy River, near Cypress Bank Landing, *F. & L.,* no. 13,214.

On a sheet of no. 12,520 Dr. R. T. Clausen has noted departures from typical *Najas flexilis* in length of style, slenderness of fruits, etc. To these should be added fleshier and firmer leaves. I leave the problem to Clausen, who has done clarifying work on the genus.

N. guadalupensis (Spreng.) Morong. To the published records add the following. King William County: fresh tidal shore of Mattaponi River at Horse Landing, near King William Courthouse, *Fernald & Long*, no. 11,510; similar habitat northwest of King William Courthouse, no. 12,522. Princess Anne County: shallow pools in brackish to fresh marsh along Back Bay east of Creeds, *Fernald & Long*, no. 10,871; shallow pool in brackish to fresh marsh along Back Bay, at eastern margin of Long Island, *F. & L.*, no. 10,478; fresh to brackish water over sandy bottom, Back Bay, Long Island (extreme depth of water about 4 feet), *F. & L.*, no. 10,872.

?N. gracillima (A. Br.) Morong. King William County: fresh tidal margin of Mattaponi River, northwest of King William Courthouse, *Fernald & Long*, no. 12,521. New Kent County: fresh tidal marsh by Chickahominy River, Walker, *F. & L.*, no. 13,511; fresh tidal marsh by Lacy Creek, west of Walker, *F. & L.*, no. 13,510. Charles City County: fresh tidal margin of Chickahominy River near Cypress Bank Landing, *F. & L.*, no. 13,213, and at Graves Landing, north of Holdcroft, no. 13,512.

The material from tidal flats in eastern Virginia and from along the Delaware seems to differ from true *N. gracillima* of fresh sandy or peaty pools in different texture and, perhaps, shoulders of the stipular sheaths. Again I commend the problem to Dr. Clausen.

*Sagittaria **planipes,** sp. nov. (tab. 1056, fig. 1–6), a *S. latifolia* differt bracteis planis nec cucullatis vel navicularibus; pedicellis compressis planis; antheris ovatis 1–1.3 mm. longis.— Norfolk County, Virginia: deep peat and mud, southeastern shore of Lake Drummond, Great Dismal Swamp, west of Wallaceton, September 15, 1941, *Fernald & Long*, no. 13,517 (type in Herb. Gray.).

Sagittaria planipes superficially suggests *S. latifolia* Willd., var. *obtusa* (Muhl.)' Wiegand, having very similar leaves and achenes. Its flowering tufts, however, terminate very long and deeply buried slender caudices without evident bulbous enlargement. The bracts subtending the pedicels are flat (fig. 2), instead of cucullate or boat-shaped (fig. 7); the pedicels strongly

flattened (FIGS. 3 and 4), instead of terete, very strongly ascending, the lower ones in maturity 2–5 cm. long, the pedicels of *S. latifolia* and var. *obtusa* usually more spreading or spreading-ascending, terete, and the lower ones rarely so prolonged. The anthers of *S. planipes* (FIG. 5) are ovate or ovate-quadrate and only 1–1.3 mm. long, the nearly linear anthers (FIG. 8) of *S. latifolia*, var. *obtusa* being 1.5–2.3 mm. long. Differing in its bracts, pedicels and anthers, *S. planipes* is apparently a distinct species, although further material may prove it to be a strong variety of *S. latifolia*.

The collection consists of one fairly respectable specimen (FIG. 1) and a second badly eaten individual, not the kind of representation of a plant the collectors aim to secure. The material was got under rather strenuous conditions which I described in RHODORA, xliv. 365 (1942):

> Lake Drummond was so phenomenally low that it had been difficult to navigate, on account of drowned cypress-knees, and it was, consequently, necessary to anchor hundreds of yards from the thicket and to wade, often slipping on submerged logs, to shore. At one point on the southeastern side, where we saw a vivid green carpet of low vegetation, Long and I struggled ashore, guiding ourselves by means of oars as sounding-rods and sinking each step well above our knees into the plastic clay of the bottom. Even after we got to the green carpet the clay, above low-water level, was so pasty and deep that we wallowed and tumbled with great ease but kept enough poise and breath to collect only with extreme difficulty. Pulling and grabbing as best we could we brought to the boat a miscellany of specimens and, after it was too late, we discovered that the *Sagittaria* of this deep mud had peculiar bracts and strongly compressed pedicels; furthermore it evidently has prolonged subterranean rhizomes. The material is rather inadequate and we needed more conclusive specimens. Unfortunately, however, when, in October, we tried to get to Lake Drummond for it, the Feeder was closed to navigation on account of repairs going on. The *Sagittaria* is one of many problems left for the future.

The war-years making Lake Drummond inaccessible to us, I now venture to describe the strange *Sagittaria*, hoping another season to secure fuller and better material.

THE IDENTITY OF THE LINNAEAN ALISMA CORDIFOLIA.—

ECHINODORUS CORDIFOLIUS (L.) Griseb. in Goett. Abh. vii. 257—repr. 109 (1857), at least as to basonym, *Alisma cordifolia* L. Sp. Pl. 343 (1753). *Sagittaria radicans* Nutt. in Trans. Am. Phil. Soc. v. 159 (1837). *E. radicans* (Nutt.) Engelm. in Gray, Man. 460 (1848) and ed. 2: 438 (1856).

It is astounding that the species, *Echinodorus cordifolius*, based directly on *Alsima cordifolia* L. Sp. Pl. (1753) "*Habitat in* Virginia" and with Morison's very characteristic figure cited by Linnaeus "Sagittaria virginiana, obtusiore lato folio, floribus albis. *Moris.* hist. 3. *p.* 618. *s.* 15. *t.* 4. *f.* 6"., should have been generally treated as a South American species unlike that of Virginia, or, more recently, as being the much smaller *E. rostratus* (Nutt.) Engelm., the latter based on the small and erect *Alisma rostrata* Nutt., l. c. of the Mississippi drainage, thence westward and southwestward. The plant of southeastern Virginia, along the James, Blackwater and Nottoway Rivers, is exactly *E. radicans*, that species extending up the Coastal Plain from Florida, across eastern South and North Carolina. Morison's figure of his *Sagittaria virginiana* is quite characteristic and the type in the Linnaean Herbarium shows portions of two inflorescences, one just out of anthesis, the other in fruit, either of which could have come from the bottomlands of the James or the Nottoway. The microfilm of the type and the enlargement of it in the file at the Arnold Arboretum is unquestionable. It is no longer right to follow those authors who insist that the plant of Virginia really came from South America or is *E. rostratus* of the Mississippi drainage and westward. When Nuttall described the latter, as *Alisma rostrata*, he said "Nearly allied, apparently, to A. cordifolia of South America". "How do they get that way?" The original account by Linnaeus was, seemingly, of no importance.[1]

*Dactylis glomerata L., var. detonsa Fries. Norfolk County: very abundant on roadsides and in damp old clearings and thickets, north of Wallaceton, *Fernald & Moore*, no. 15,030.

*D. glomerata L., var. multiflora G. Beck. Greensville County: soft shoulder of road north of Skipper's, *Fernald*, no. 14,773.

Triplasis purpurea (Walt.) Chapm. In Gray's Manual, ed. 7, Hitchock states the height or length of the culms as 3–8 dm.,

[1] With the name *Echinodorus cordifolius* returned to the species described by Linnaeus, the following transfer becomes necessary:

E. rostratus (Nutt.) Engelm., forma **lanceolatus** (Engelm.), comb. nov. *E. rostratus*, var. *lanceolatus* Engelm. ex. Wats. & Coult. in Gray, Man. ed. 6: 556 (1891). *E. cordifolius*, var. *lanceolatus* (Engelm.) Mackenz. & Bush, Man. Fl. Jackson Co., Mo. 10 (1902). *E. cordifolius*, forma *lanceolatus* (Engelm.) Fernald in Rhodora, xxxviii. 73 (1936).

in his Manual of Grasses as "30 to 75 cm.". On the coast of New England the culms may stop at a height of 1 dm.; among the dunes of Chesapeake Beach, Princess Anne County, Virginia (*Fernald, Long & Clement*, no. 15,174), they reach a height of 1.2 m. See p. 101.

Agrostis scabra Willd. Isle of Wight County: large stools in a moist sandy and peaty clearing south of Lee's Mill, *Fernald & Moore*, no. 15,032.

Our first evidence of the relatively northern *Agrostis scabra* in a region where the much smaller and earlier *A. hyemalis* (Walt.) BSP. abounds. See Fernald in Rhodora, xxxv. 207, 208, pl. 246 (1933).

The Identity of Cornucopiae altissima.—

Agrostis altissima (Walt.) Tuckerm. in Am. Journ. Sci. xlv. 44 (1843), excl. var. *Cornucopiae altissima* Walt. Fl. Carol. 74 (1788). *Trichodium elatum* Pursh, Fl. Am. Sept. i. 61 (1814). *A. elata* (Pursh) Trin. Mém. Acad. St. Pétersb. ser. VI. Sci. Nat. iv. 317—repr. 71 (1841). *Trichodium altissimum* (Walt.) Michx. ex Wood, Class-bk. ed. 2: 599 (1847). *A. perennans elata* (Pursh) Hitchc. U. S. Dept. Agr., Bur. Pl. Indus. Bull. no. 68: 50, pl. xxxiii. (1905). *A. hyemalis*, var. *elata* (Pursh) Fernald in Rhodora, xxiii. 229 (1921). *A. perennans*, var. *elata* (Pursh) Hitchc. Man. Grasses U. S. 340, 784 (1935).

Since Pursh's original account of his *Trichodium elatum* cited as pure synonyms the earlier *Cornucopiae altissima* Walt. (Pursh liking another name which had the same meaning) and *Agrostis dispar* Michx., the name *Trichodium elatum* was illegitimate on two counts, for Pursh failed to take up either of the earlier names of plants which he considered identical with his. Hitchcock, in U. S. Dept. Agr., Bur. Pl. Indus. Bull. no. 68: 50 (1905), quoting Walter's brief diagnosis, "culmo erecto, duro; panicula coarctata; flor. magnis [as compared with those of *C. perennans* immediately preceding]", wrote as follows:

> "This description is scarcely sufficient to identify the species, which is not represented in Walter's herbarium. The plant which I have referred to *A. elata* is quite rare and there are few specimens from the Carolinas, the region covered by Walter's Flora, and it certainly is not common. There does not seem sufficient evidence for taking up Walter's name, nor is it likely to be any better known in the future. The name is inserted here [among synonyms] because later authors have assumed that this was *Trichodium elatum* Pursh. It is more likely to have been *Agrostis alba* L."

Of that more below. Of *Trichodium elatum* Hitchcock wrote: "The type specimen, or at least one collected by Pursh, is in the herbarium at Kew"; while regarding *Agrostis elata* (Pursh) Trin., which Trinius had based nomenclaturally directly on "*Trichodium elatum Pursh* Fl. Amer. I, p. 61", Hitchcock (by some thought to understand the principles of plant-nomenclature) said "The type specimen is in the Trinius herbarium at St. Petersburg. There are two plants mounted on the sheet, one from pine barrens of New Jersey, collected by Doctor Torrey and sent by Greville, 1835. The other, also from New Jersey ('Nov. Caesar.'), sent by Doctor Gray, 1835. The second would be the type as it is the one first mentioned by Trinius . . . Both specimens agree with Pursh's type. It may be best to consider this primarily a change of name [it certainly was a transfer from one generic name to another!], in which case the type is Pursh's plant." Obviously, it would seem, when Trinius cited the Pursh name as the nomenclatural basis of *Agrostis elata* he did not change the type!

Now as to *Agrostis altissima* (Walt.) Tuckerm. Tuckerman based his specific epithet on that of Walter, although he, like Pursh and others, added to the synonymy *Agrostis dispar* Michx., which Hitchcock has said was merely *A. alba* L. Furthermore, Tuckerman, citing Carolina and New Jersey specimens, gave a clear description of the Coastal Plain species with "culmis erectis duris rigidis crassiusculis, foliis . . . scaberrimis . . . , panicula coarctata ramis verticillatis erectis rigidiusculis scabris summitatibus dense floridis, glumis magnis", etc., this description ampler but containing the points given by Walter, "culmo erecto, duro; panicula coarctata; flor. magnis", a diagnosis of which Tuckerman wrote: "The description of Walter can hardly be improved as respects the prominent features of this very distinct species", although Hitchcock, never having handled fresh material (as shown by his citation of specimens) found it "scarcely sufficient to identify the species". Having many times collected and studied in the field both of Walter's species, *Cornucopiae perennans* and *C. altissima,* I concur in Tuckerman's characterization of the brief but clear diagnosis.

It should be noted that, on his page 74, Walter had two new species: first *Cornucopiae perennans*, "culmis subdecumbentibus;

foliis latioribus; panicula longa diffusa, ramis trichotomis verticillatis". He added further notes, of which certain ones are significant, for instance his "Gramen undique laeve, . . . in hyeme vigens, radicibus geniculisque se cito propagans". Then followed *C. altissima*, with erect, hard culms, crowded panicle but large spikelets. Now, when one compares the two species, *Agrostis perennans* and *A. altissima* (*A. elata*), as they abound in southeastern Virginia (to say nothing of the Carolinas, except that there is an old sheet of Ravenel's from "damp pineland", Santee Canal, September, in the Gray Herbarium—this from close to Walter's home, Walter's classical volume with the preface signed from "Ripas Fluvii Santee, 30 Dec. 1787")—when the two are compared it is notable that the latter, a plant of bogs, wet pinelands and clearings or margins of pools, is upright, with hard and stiff culms, usually without any new green basal offshoots in late autumn, the cauline leaves 5–10, with overlapping scabrous sheaths and stiff, erect narrowly linear to involute harsh blades 0.6–2 dm. long, their ligules 4–5 mm. long; the narrowly ovoid to lanceolate panicle with few ascending and strongly scabrous branches forking above the middle into appressed, short floriferous branchlets; spikelets purplish or bronze, 2.5–3.8 mm. long, with slightly unequal lance-attenuate glumes, the lemma 2.3–3 mm. long.

On the other hand, *Agrostis perennans* of woods, thickets and clearings (not of bogs and wet pineland) has softer culms and, as Walter clearly stated, sends out in autumn green, overwintering basal leafy tufts. Its 3–7 loosely ascending to divergent cauline leaves are flexible, flat and only slightly scabrous or smooth ("Gramen undique laeve"—*Walter*), their ligules 2.5–5 mm. long; the loosely ascending to wide-spreading branches of the panicle smooth or barely scabrous; the usually green spikelets 2–(rarely) 3 mm. long, the lemma 1.5–2 mm. long. These differences in the spikelets were clearly seen by "The artist", unnamed by the author of the text but from the signature "*A. C.*" on the plates fortunately apparent, in Hitchc. l. c. plates xxxi–xxxiii, but their significance seems not to have been appreciated. The plates are, indeed, very fine and fully justify Hitchcock's characterization (p. 14): "The artist has faithfully reproduced all the technical details of the spikelets". Since she clearly showed the

spikelets of *A. perennans*, var. *elata* as 3.8 mm. long, it is too bad that this accurate measurement was not recorded in the text (or in the later Manual of Grasses), where the maximum length for the inclusive species is given as 3 mm.

Further indicating Hitchcock's failure to understand *Agrostis altissima* (*A. elata*) are the facts that, in the synonymy of his misunderstood *A. perennans*, var. *elata*, Hitchcock (Man. of Grasses U. S. 784, 785 (1935)) places *A. perennans* forma *chaetophora* Fernald in Rhodora, xxxv. 317 (1933), the type from Huntingdon (not "Huntington"—*Hitchc.*) County, Pennsylvania, 150 miles inland from the Pine Barrens of New Jersey where *A. perennans*, var. *elata* (i. e. *A. altissima*) really occurs, Huntingdon County being among the Allegheny Mountains and the type being perfectly ordinary *A. perennans* but with awned lemmas; and *A. perennans*, var. *aestivalis*, forma *atherophora* Fernald, l. c., the type from Co. Terrebonne, Quebec (not simply "Terrebonne, Quebec"—*Hitchc.*, the locality in Co. Terrebonne being Lac Tremblant), 325 miles north of the northern limit of Hitchcock's *A. perennans*, var. *elata* on the Coastal Plain of southeastern Massachusetts, forma *atherophora* being characteristic *A. perennans* var. *aestivalis* with 4 remote smoothish and flat cauline leaves, very diffuse panicle and spikelets 2 mm. long but with the lemma awned. Its collector had originally called it *A. canina*, a natural error since he used Gray's *Manual*, in which Hitchcock's key read as follows:

"Lemma awnless. . . . . 4. *A. perennans.*
Lemma awned.
Spikelets 2 mm. long. . . . . 5. *A. canina.*
Spikelets 3 mm. long. . . . . 6. *A. borealis.*"

Nevertheless, in his Manual, Hitchcock did not place either *A. canina* or *A. borealis* in the synonymy of his vaguely understood *A. perennans*, although forms of them both (usually with awns) are well known with awnless lemmas. The same inconstant "Lemma awned" as opposed to "Lemma awnless" is there repeated by the author of a detailed monograph of the genus in North America![1]

The upshot of this discussion is, that, since the secondarily

[1] Another awned form is

Agrostis alba L., forma **aristata** (Fernald), comb. nov. *A. stolonifera*, forma *aristata* Fernald in Rhodora, xxxv. 317 (1933).

basic name *Trichodium elatum* Pursh was illegitimate, it might be necessary further to confuse matters by giving it a new and legitimate name. Since, however, the original basic *Cornucopiae altissima*, briefly defined by Walter to contrast with his preceding *C. hyemalis* and *C. perennans*, was assigned characters, "culmo erecto, duro; panicula coarctata; flor. magnis", in contrast with those of the other two, Walter's characterization was, as Tuckerman found it, almost vividly accurate. I see no reason, from rather close familiarity with such a Coastal Plain species, why we should not maintain for it the name *Agrostis altissima* (Walt.) Tuckerm. If it be true that no specimen (type) of Walter's own collection now exists, then, since Pursh merely renamed and redescribed it under a substitute name, we may accept as the lectotype the Pursh specimen preserved at Kew.

The two Varieties of Spartina cynosuroides.—In coastwise Virginia as well as northward and southward *Spartina cynosuroides* (L.) Roth occurs as two usually well defined ecological varieties. One, typical *S. cynosuroides*, is primarily a plant of fresh to but slightly brackish tidal estuaries, the other, which was described by Michaux as *Trachynotia polystachya*, is confined to saline shores and salt marshes. The two are distinguished as follows:

S. cynosuroides (L.) Roth, Catal. Bot. iii. 10 (1806). *Dactylis cynosuroides* L. Sp. Pl. 71 (1753), clearly described "*Spicae sex s. plurimae, secundae, divergentes*", the type (photograph before me) from Gronovius (*Clayton*, no. 577). The plant, with 6 or more divergent spikes is, in light of more adequate material, characterized by its inflorescence of 6–50 spikes in an open raceme, these subdistant or distant, often definitely peduncled. It follows mostly fresh tidal shores northward to Connecticut. In southeastern Virginia it extends up-river far above the areas of salt marsh, up the James at least to Gray's Creek in Surry County. See p. 90.

Var. polystachya (Michx.) Beal, Grasses N. Am. ii. 398 (1896). *Trachynotia polystachya* Michx. Fl. Bor.-Am. i. 64 (1803), described with "spicis numerosis inordinatis, passim subaggregatis . . . in inundatis maritimis, a Nova Anglia ad Floridam". This Beal took to be the strictly maritime plant which is characterized by the dense or soon dense inflorescence with the 30–100

or more appressed-ascending or erectish spikes only short-peduncled to subsessile. It extends northward in saline marshes to Cape Cod. We have not seen it on the estuaries of Virginia. Mr. Long informs me that in New Jersey, Delaware and eastern Pennsylvania the two varieties are similarly selective of habitat.

Spartina patens (Ait.) Muhl., var. **monogyna** (M. A. Curtis), comb. nov. *Limnetis juncea*, var. *monogyna* M. A. Curtis in Bost. Journ. Nat. Hist. i. 136 (1835). *Trachynotia juncea* Michx. Fl. Bor.-Am. i. 64 (1803). *Limnetis juncea* (Michx.) L. C. Richard in Pers. Synop. i. 72 (1805). *S. juncea* (Michx.) Willd. Enum. 81 (1809). *S. patens*, var. *juncea* (Michx.) Hitchc. in Rhodora, viii. 210 (1906).

Spartina patens, based on *Dactylis patens* Ait. (1789), has two wide-ranging varieties, each extending many hundreds of miles beyond the limits of the other; but from southern New Hampshire to Virginia with ranges, but very rarely habitats, overlapping. The northern variety, true *S. patens*, follows saline or brackish marshes and inundated shores from Newfoundland around the Gulf of St. Lawrence and up the River St. Lawrence to the limit of saline marshes, thence southward around the coast to marshes of Lynnhaven Bay in northern Princess Anne County, Virginia, with inland areas in western New York and southeastern Michigan; its northern limit more than 600 miles beyond the northern limit of the next. Var. *monogyna* (*S. patens*, var. *juncea*) is on saline shores or, more often, on coastal sands from southern New Hampshire to Florida, thence to Texas, its southwestern limit, following the coast, more than 2000 miles beyond the southern limit of typical *S. patens*. The two are not only geographically largely separated; morphologically they are strikingly different. Their distinctive characters are noted below:

Typical S. patens: rhizomes 1–3 mm. thick; culms 1–2.5 mm. thick at base, 1.5–8 dm. high or long; new green cauline leaves of the season usually 4 (2–5), the blade of the 2nd from the summit averaging 1 (0.5–2) dm. long; spikes 1–4, mostly purple; spikelets 9–13 mm. long, loosely imbricated, straightish, ascending, with suberect free tips; 2nd glume acuminate.

Var. monogyna (var. *juncea* (Michx.) Hitchc.): mostly coarser; rhizomes 2–6 mm. thick; culms 1–6 mm. thick at base, 0.2–1.5 m. high; new green cauline leaves averaging 6 (5–9), the 2nd from summit averaging 2 (1–5) dm. long; spikes 2–9, purplish to stramineous; spikelets 7–10 mm. long, tightly imbricated and strongly arching, with appressed tips; 2nd glume often merely acute or even blunt.

Although in his Manual of Grasses of the United States Hitchcock merged the two rather striking and geographically only slightly overlapping varieties (as he did numerous others

which are well defined), in his treatment in Gray, Manual, ed. 7, in deference to some who clearly saw the distinctions, he had kept them apart.[1]

M. A. Curtis, evidently taking *Limnetis juncea* to be true *S. patens*, described his new variety as follows:

> "*Limnètis júncea*, var. *monógyna*. Stem about 3 feet high; Leaves 8–12 inches long; Spikes 3–6, about their length distant from each other; Style 2-cleft like L. cynosuróides. In every other particular agreeing exactly with L. júncea. Grows abundantly on the sandy beach at the mouth of Cape Fear river. L. júncea has not been found there."

The ISOTYPE of Curtis's variety in the Gray Herbarium, the label written by Curtis, is quite typical *Trachynotia juncea* Michx., concerning the identity of which I noted, when studying Michaux's type in 1903, "The sand-dune plant of Martha's Vineyard". Curtis wrote beneath his new name "*S. juncea*, Ell.!", thus indicating, as suggested above, that he thought that true (not Elliott's) *Spartina juncea* was the smaller *S. patens* which "has not been found there [at mouth of Cape Fear River]". The Curtis type or isotype is closely matched by such characteristic specimens as the following: sea-beaches, Cape May, New Jersey, August, 1872, *Canby; Fernald & Griscom*, no. 2711, *Fernald, Long & Fogg*, nos. 4793 and 5214, and *Fernald & Long*, no. 11,235, all from sandy coast or dunes of Virginia; *Ruth*, no. 537 from Fort Marion, North Carolina; *Biltmore Herb.*, no. 3516[a] from sands of Smith's Island, North Carolina; *Godfrey*, no. 4651 from Carolina Beach, North Carolina; *Godfrey & Tryon*, no. 324 from dune-hollow, Pawley's Island, South Carolina; *Harper*, no. 1545 from drifting sands of Cumberland Island, Georgia.

(*To be continued*)

HELIANTHUS GROSSESERRATUS IN NEW ENGLAND.—Among the flowering plants not native to New England which have been spreading eastward from central United States is *Helianthus*

[1] While preparing the treatment of *Gramineae* for Gray, Man. ed. 7, Professor Hitchcock received a suggestion from one of the editors of that edition, that the wide-ranging species of the United States differed in many characters from the more northern and Eurasian *Glyceria fluitans*, with which it had been confused. Consequently he published as his new discovery *G. septentrionalis* Hitchcock in RHODORA, viii. 211 (1906), without noting the most important differential characters. While preparing the Manual of Grasses of the United States its author wrote to the botanist who had pointed out to him the distinctions of *G. septentrionalis*, asking how his own species differed from that of Linnaeus. In case of the smaller northern *Spartina patens* and its coarser and usually more southern variety the distinctions were apparently similarly lost.

grosseserratus Martens, which is sufficiently unusual in New England to warrant noting a new station. It was found in Auburn, Worcester Co., Mass., in 1944 by Miss Ethel G. Upham. There are two colonies in a moist meadow adjoining a brook and a large area of *Typha angustifolia*, about opposite no. 850 Southbridge Street, in the part of the town called West Auburn. The following summer, Dr. & Mrs. Burton N. Gates located the stands and collected further specimens.

The writer of this short note wishes to thank Dr. M. L. Fernald who has called his attention to the following facts. Labels of this species in the Gray Herbarium and the Herbarium of the New England Botanical Club frequently bear notations indicating that its occurrence here is as an escape from cultivation. In Gray's Synoptical Flora (1884) it was known eastward only to Ohio. In Gray's Manual, ed. 6 (1890), its eastern limit was still given as Ohio. Dr. Fernald states that it has been spreading in New England since 1894. In 1914, Hoffmann collected it in Stockbridge, but apparently thought it not well established, as he did not include it in his Flora of Berkshire County, Mass. (1922). Harger, in Flowering Plants and Ferns of Conn. (1910) comments that it is "probably introduced," an opinion which is confirmed in the Supplement (1930).

As the occurrence of this Helianthus is still very limited in New England, it will be interesting to note its further spread.—Frank C. Seymour, Lancaster, Mass.

Rhododendron carolinianum naturalized in New England.—Though many plants from the Southern Appalachian Mountains grow well when moved to New England, few apparently make themselves sufficiently at home to reproduce by seed. It was with surprise and pleasure that I found literally hundreds of self-sowed plants of *Rhododendron carolinianum* Rehd. scattered as far as fifty yards from five established bushes in an ornamental planting at Norfolk, Connecticut. These reproductions are of various ages with some already arrived at flowering size. The oldest is perhaps seven or eight years old, and during these years a record low temperature of $-27°$ F. was established. —H. Lincoln Foster, Norfolk, Conn.

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W. S. White

Rhodora

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THE NEW ENGLAND BOTANICAL CLUB

Vol. 49. May, 1947. No. 591.

NOTES ON THE CORAL-BERRY (SYMPHORICARPOS ORBICULATUS)

Edwin D. Hull

The purpose of this article is to record some observations on the above plant as it has come under my notice in Gary, Lake Co., Indiana, and a solitary plant in a yard at Hobart, Indiana, about five miles away. The plant is cultivated sparingly in this region, and some have run wild, the seeds being disseminated by birds. Deam's "Flora of Indiana" says probably native only in the southern part of the state.

Cleistogamy: I have never seen this feature mentioned in either botanical or horticultural literature. My attention was first directed to it by a neighbor, Mr. W. C. Nichols, who brought the species from western Missouri, and very kindly gave me a plant. Mr. Nichols has stated that he never saw the plant with showy flowers. I have not seen a cultivated plant bearing any but cleistogamous flowers. All the cultivated shrubs are rather small, the height of a typical stem from the specimen in my yard being 1.1 m., with two growth-rings, and all others in cultivation that I have seen are about the same size. On such shrubs cleistogamous flowers appear about July 15. Fruit beginning to ripen was first noted on the shrub in Hobart, October 14, 1946. In Mr. Nichols' yard fruit was just ripening October 23, 1946, the earlier ripening of the Hobart fruit being probably due to this town being several miles from Lake Michigan.

On the other hand, plants which have run wild, and grow decidedly larger, produce rather showy flowers in abundance, and no cleistogamous flowers ever appear. In an oak woods in the eastern part of Gary, the largest specimens being along the edges of marshes, are several plants with these showy flowers. Such flowers are produced early, the specimens I have before me being dated May 6, 1946. Both ripened fruit, and that, more or less green, was noted June 21, 1946. The majority of the flowers are produced on older shoots, although shoots of the current year may have flowers at or near the base. Cleistogamous flowers, however, seem always to appear on shoots of the current year.

Other Notes: The plant grows from 2–5 feet high, according to Britton & Brown "Illustrated Flora", a maximum of 7 feet according to "Hortus Second". This seems to be true in all the plants I have observed except one, the exception being a giant specimen 3.93 m. tall, more than 5 feet taller than the maximum of other observers. A typical stem from this plant showed 6 growth-rings.

In regard to the berries, the 7th Edition of "Gray's Manual" says "berries small". This is true of many of the fruits of the Hobart specimen, where the branches were heavily loaded; however, variations in size were noted, and the berries on the other plants could hardly be said to be small. Bailey's "Manual of Cultivated Plants" says that berries ripen in late autumn, and berries from cleistogamous flowers do ripen in the fall, but plants with showy flowers begin to ripen fruit even before summer has commenced, and by autumn all fruit has disappeared.

Specimens illustrative of this article have been sent to the Gray Herbarium.

Gary, Indiana.

A Variety of a Western Polemonium in Minnesota.—Since *Polemonium reptans* L., occurring in southeastern Minnesota, has been regarded as the sole representative of the genus in the state, the discovery of a new variety of a western species in the north-central region of the state was not altogether without interest.

The plant first came to the attention of the writer in the winter of 1944 during a showing of a film on Minnesota wild flowers by

Mr. W. F. Kohagen of Hibbing. A tall *Polemonium* in arborvitae swamp, among species peculiar to such habitats, was surprising. On the following June 28, Mr. Kohagen mailed specimens from the colony he had previously filmed in color. His collection consisted only of inflorescences, but it was obvious that the plant in question was very different from the eastern species reaching Lake Pepin and Winona regions.

For adequate study material, the writer made a collecting trip to the colony at Sturgeon Lake, north of Hibbing, on July 2, and another a month later for fruiting specimens. After a considerable study the plants were determined as *P. occidentale* Greene, but they differed from western material by the absence of gland-tipped hairs and larger upper cauline leaves. Moreover, during this study it became clear that the probable garden-escape, locally established in East Duluth, previously reported as *P. occidentale* Greene,[1] must be referred to *P. caeruleum* L.

The finding of the plant seemed to fulfill a quest. It was recalled that several years ago Dr. E. T. Wherry alerted the writer to the probability of occurrence of *Polemonium* in swamp habitats. His study of the specimens resulted in the description of *Polemonium occidentale* Greene, subsp. *lacustre* Wherry. Since, however, the plant would by most conservative botanists be ranked as a geographic variety rather than a true subspecies, it should be called

POLEMONIUM OCCIDENTALE Greene, var. **lacustre** (Wherry), stat. nov. Ssp. *lacustre* Wherry in Am. Midl. Nat. **34** (2): 376, fig. 2, 1945.

The colony is located in a roadside swamp, 3.5 mi. n. of Sturgeon Lake Observation Tower, about 20 mi. n. of Hibbing, St. Louis Co. About an acre in extent, it is the only known station in the state, indicating an isolated eastward extension of the range of a well known western species of wide distribution.—OLGA LAKELA, State Teachers College, Duluth, Minn.

[1] Lakela, Olga. RHODORA **40** (475): 280. 1938.

A new Binomial in Juncus,—In Rhodora **35:** 235 (1933) Dr. Fernald made a good case for properly published binomials for hybrids, pointing out that it is far more convenient to so list them rather than to designate at each reference to them the long hybrid formula; he then went on to binomialize two hybrids in *Juncus* and describe a third.

In line with his suggestion, with which I quite agree, I am proposing a new name for the hybrid *Juncus alpinus* var. *insignis* × *brevicaudatus*, described by Blake in Rhodora **20:** 103 (1918). The new name is one that Dr. Hermann tells me he has long had in manuscript but has never published.

In addition to Blake's collection at Bathurst, New Brunswick (l. c.), there exist to our knowledge the following records:

R. R. Dreisbach 6851, roadside 10 miles east of Manistique, Schoolcraft County, Mich., Aug. 12, 1930; in herbarium Dr. Hermann. *Walter Koelz* 4682, 4681 and 4687, all carrying the same data—beach-flat, Whitefish Bay, north channel of Northern Lake Huron, Province of Ontario, Canada, Aug. 30, 1932. The last two numbers are in the Univ. of Michigan herbarium, annotated as × *J. gracilescens.* 4682 is in the herbaria of the Univ. of Minnesota and Dr. F. J. Hermann and is similarly annotated. *C. O. Grassl* 408, on beach west of Hunt Point, near East Knob, Cloche Mts., Sudbury County, Ontario, Aug. 29, 1932; in herbaria of Univ. of Michigan and Dr. Hermann, annotated as the next preceding. *Olga Lakela* 1797, wet sedgy meadow at the "barrens" sec. 13, Duluth, St. Louis County, Minn., Aug. 31, 1936; in herbaria of Duluth State Teachers College and the Univ. of Minnesota.

It is probable that the Univ. of Michigan distributed duplicates of the Koelz and Grassl collections to other herbaria under Hermann's manuscript name, which is an added reason for its publication:

× Juncus **gracilescens** Hermann, nom. nov. (*J. alpinus* var. *insignis* [i. e. var. *rariflorus* Hartm.] × *brevicaudatus* Blake, Rhodora **20:** 103 (1918).—S. C. Wadmond, The University of Minnesota, Minneapolis, Minn.

Photo B. G. Schubert

Paspalum setaceum, var. calvescens, all figs. from type: figs. 1 and 2, portions of plants, × 1; fig. 3, upper, and fig. 4, lower leaf-surface, × 10; fig. 5, spikelets, × 10.

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. FERNALD

(*Continued from page 115*)

CTENIUM AROMATICUM (Walt.) Wood. To the very local stations in Virginia add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,177.

Ordinarily *Ctenium aromaticum* fully justifies its name, the bruised bases emitting a delightful pungent fragrance suggestive of lemon. The clumps at the new station could not be induced to give off more than an uninteresting grassy odor. See p. 99.

*ANTHOXANTHUM ODORATUM L., forma GIGANTEUM P. Junge. Abundant on roadsides of Nansemond and southwestern Norfolk Counties. NANSEMOND COUNTY: east of Magnolia, *Fernald & Moore*, no. 15,033.

The largest extreme of the species: the culms 0.6–1 m. high; panicle 7–14 cm. long, often interrupted; spikelets 1–1.2 cm. long. See p. 99.

PASPALUM PRAECOX Walt., var. CURTISIANUM (Steud.) Vasey (*P. lentiferum* Lam.). To the two local stations, one in eastern Sussex, one in southern Greensville, add a more extensive one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, nos. 15,192 and 15,193. See p. 99.

*PASPALUM SETACEUM Michx., var. **calvescens,** var. nov. (TAB. 1057), foliis angusto linearibus 1.5–3.5 mm. latis erectis valde elongatis glabris vel sparsissime strigosis.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,191 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

A second and more extensive colony was noted in another bog (Magnolia swamp) nearly a mile farther west. In the confusion caused by the rapid discovery of several notable plants the present writer laid down and forgot the series collected from this bog. Var. *calvescens* is habitally quite like the stricter states of *Paspalum setaceum* (details in PLATE 1058, FIGS. 1–3) but, whereas the leaves of true *P. setaceum* are densely appressed- or strigose-villous, those of var. *calvescens* are essentially glabrous,

with only few remote and short trichomes. The slight difference in the shape and breadth of the spikelets is well within the range of variation in the species. In its essentially glabrous foliage var. *calvescens* might be mistaken for *P. setaceum*, var. *longepedunculatum* (Le Conte) Wood (*P. longepedunculatum* Le Conte), but that extreme variety has shorter and broader leaves confined chiefly to the base of the plant and inclined to be loosely divergent (PLATE 1058, FIG. 4). Typical *P. setaceum* prefers dry siliceous habitats; var. *calvescens* grows in wet *Sphagnum* or peat. See p. 99.

*PANICUM (sub-§ LANUGINOSA) **glutinoscabrum,** sp. nov. (TAB. 1059), planta cespitosa 7–9 dm. alta; culmis firmis erectis basin versus 1.5–2 mm. diametro, internodiis 5 elongatis scabropuberulentibus, pilis minutis cinereis cum verrucis viscidis vel glutinosis adspersis; nodis villoso-barbatis; foliis caulinis primariis lanceolatis ad 7 cm. longis 7–8 mm. latis attenuatis utrinque breviter pilosis, pilis cum verrucis viscidis adspersis; vaginis papillato-verrucosis, glutinosis, breviter pilosis; ligulis 4–5 mm. longis aciculiformibus; paniculis primariis valde exsertis ovoideis 6–9 cm. longis 6–7 cm. diametro, rhachi minutissime puberulo, ramis adscendentibus; statu autumnali suberecto breviter ramoso, ramis adscendentibus 1–6 mm. longis, valde foliosis paniculis terminalibus ad 2 cm. longis; spiculis ellipsoideis subacutis 1.7–1.8 mm. longis 0.7–0.8 mm. crassis breviter hispidulis; gluma inferiore deltoideo-ovata subacuta 0.6–0.7 mm. longa, superiore lemmateque sterili aequilongis, fructum lucidum subaequantibus.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,186 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

Panicum glutinoscabrum is a perplexing plant to orient. In the general characters of inflorescence and relatively few primary nodes and autumnal axillary branches it seems to belong to sub-§ *Lanuginosa*, but its very glutinous or viscid quality is apparently unique. The blackish wart-like secreting glands which abound, especially on the sheaths and leaf-blades, are a striking character, the sheaths and internodes of the culm being scabridulous. See p. 99.

*ECHINOCHLOA STAGNINA (Retz.) Beauv. PRINCESS ANNE COUNTY: erect weed, very abundant in a cultivated field west of Chesapeake Beach, *Fernald, Long & Clement*, no. 15,182.

Echinochloa stagnina is a characteristic oriental species (southern Asia, Malayan Islands and Africa) with very tall, erect stems, erect leaves, hairy ligule and relatively slender stiffish panicles, not generally (if at all) recognized as naturalized in North America. At the station in Princess Anne County the very tall (about 1.5 m.) plants were superabundant as a weed and greatly overtopped the intended crop. Like so many invaders from Asia it will doubtless rapidly spread.

The binomials, *Echinochloa crusgalli* (L.) Beauv., *E. echinata* (Willd.) Beauv., *E. stagnina* (Retz.) Beauv. and four others, are regularly ascribed by Index Kewensis to Beauv. Agrost. 53 (1812) but it is quite certain that Palisot de Beauvois did not there make the combinations; he did not even give the authors or the bibliographic citations for the reputed basonyms. On p. 53 he defined the new genus *Echinochloa* and listed as *Panicum* its "Spec. Panicum *crusgalli, cruscorvi, echinatum, lanceolatum, setigerum, setosum, stagm[n]inum,* etc.". The combinations were not there made but in the Index, p. 161, they are all listed under *Echinochloa*, although two of them are entered with doubt: *E.* "setigera?" and *E.* "stagnina?". Obviously page 161 should be added to the usual reference, and we should strengthen the bibliographic reference for *E. crusgalli* by adding t. xi. fig. ii, for the detailed figures are definitely cited in Explic. Planches et Figs., 8, as of "Echinochloa *crus-galli*" (the hyphen here inserted, though not used by Linnaeus). If the wavering inclusion of *Panicum stagninum* Retz. be considered as not validating the combination *E. stagnina*, then the specialists on the *Gramineae* and upon bibliography have a little problem in deciding who first validated the combination. I leave it to them! See p. 101.

*E. pungens (Poir.) Rydb., var. ludoviciana (Wieg.) Fern. & Grisc. Nansemond County: wet peaty and sandy shore of Exchange Pond, southwest of Everett's Bridge, *Fernald, Long & Clement*, no. 15,181.

A striking dense-panicled extreme with awnless spikelets, heretofore known in the Mississippi and Gulf drainage, northeastward to western Pennsylvania. In its occurrence on the Coastal Plain joining a large series of similarly disjunct plants.

Andropogon scoparius Michx., var. littoralis (Nash) Hitchc. To the previously recorded stations add another in

Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,198.

A. Elliottii Chapm., var. gracilior Hack. To the relatively few recorded stations add another in Nansemond County: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,195.

Cyperus rivularis Kunth, forma elutus (Clarke) Kükenth. Add a station in Nansemond County: fresh tidal shore of Western Branch, below Everett's Bridge, *Fernald, Long & Clement*, no. 15,201.

Eleocharis flavescens (Poir.) Urban. Princess Anne County: tiny tussocks abundant at border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,207. Identification confirmed by Dr. Svenson, who, in Rhodora, xli. 47 (1939), had cited two early collections from Virginia Beach. See p. 100.

E. vivipara Link. To the single station (Lake Joyce) recorded, under the synonym *E. prolifera* Torr., in Rhodora, xxxviii. 359 (1936), add the following. Princess Anne County: forming continuous turf at border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,212. Southampton County: wet peaty margin of Whitefield's Millpond, southwest of Corinth, *F. L. & C.*, no. 15,210; upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *F. L. & C.*, nos. 15,211 and 15,213.

Plants (such as no. 15,211) with umbels of 2–several peduncled spikelets are singularly suggestive of *Fimbristylis* and *Bulbostylis*. See pp. 96 and 100.

E. tricostata Torr. To the two highly localized stations already known in eastern Virginia add one in Southampton County: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *F. L. & C.*, no. 15,214, See p. 101.

Is Dichromena latifolia in Virginia?—So far as I can determine *Dichromena latifolia* Baldwin was first recorded as perhaps occurring in Virginia in Gray, Man. ed. 5: 567 (1867) but as from "S. Virginia? and southward". In the 6th and 7th editions the mark of interrogation was dropped, although I am unable to find any evidence in the material which Gray had before him of its coming north of eastern North Carolina. Any evidence of it in the state will be welcomed. See pp. 86 and 88.

Psilocarya scirpoides Torr., var. Grimesii Fernald & Griscom. To the few known stations, in Princess Anne, Norfolk

and Nansemond, add one farther inland, in SOUTHAMPTON COUNTY: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,206.

*P. NITENS (Vahl) Wood. SUSSEX COUNTY: sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, nos. 14,898 and 14,899. The first from between southeastern North Carolina and Cape May, New Jersey, already recorded in RHODORA, xlviii. 58 (1946). See p. 87.

RHYNCHOSPORA CHALAROCEPHALA Fernald & Gale. To the two recorded stations in the state (one in Isle of Wight, one in Norfolk) add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,227. See p. 98.

R. DEBILIS Gale. To the several stations (in Princess Anne, Isle of Wight, Sussex, Southampton, Dinwiddie, Prince George and Chesterfield) cited in the original publication add two in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,226; similar habitat, 1–1½ miles west of Kilby, no. 15,218. See p. 98.

R. RARIFLORA (Michx.) Ell. To the scattered stations from Princess Anne to Amelia, Dinwiddie and Greensville add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,225. See p. 98.

R. PERPLEXA Britton, var. **virginiana,** var. nov. (TAB. 1060, FIG. 5–8), planta a var. typica differt culmis foliisque plerumque crassioribus; spiculis 2.5–3 mm. longis sessilibus vel subsessilibus congestis; tuberculo depresso late rotundato.—Southeastern VIRGINIA. Dinwiddie County: wet argillaceous depressions south of Petersburg, July 14, 1938, *Fernald & Long*, no. 8603; flat pineland, Collier's Yard, 3–4 miles southwest of Petersburg, August 17, 1939, *Fernald & Long*, no. 10,981; same station, August 17, 1939, *Smith & Hodgdon* in Pl. Exsicc. Gray., no. 924; depression in argillaceous woods west of Winfield's Mill, October 13, 1941, *Fernald & Long*, no. 13,903. Sussex County: wet peaty depression in pineland 3 to 4 miles northwest of Waverly, June 12, 1938, *Fernald & Long*, no. 8115; upper border of sandy beach, Airfield Millpond, southwest of Wakefield, July 6, 1942, *Fernald & Long*, nos. 14,297 and 14,298. Southampton County: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, September 15 and 16, 1946, *Fernald, Long & Clement*, no. 15,231 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). Greensville County: pond-hole in pine and oak woods near Three Creek, north of Emporia, September 19, 1938, *Fernald & Long*, no. 9282. Surry County: exsiccated argillaceous pond-hole in

woods, about 1 mile south of Mercy Seat Church, August 23, 1938, *Fernald & Long*, no. 8989.

Typical *Rhynchospora perplexa* (our PLATE 1060, FIGS. 1–4) has, as Dr. Gale described and illustrated it, in RHODORA, xlvi. 270, plate 832, fig. 3B (1944), the "tubercle broadly deltoid", the straight sides sloping to a definite terminal angle. This is the characteristic tubercle of the type-series from Chapman (our FIG. 2) and in essentially all material from south of Virginia, only a very exceptional individual (as in the central one of FIG. 3 and the right-hand ones of FIG. 4) showing a slightly round-topped tubercle. In all the Virginian material the tubercle is more depressed and broadly rounded above and the sessile or subsessile spikelets are 2.5–3 mm. long, the often less crowded or definitely pedicelled spikelets of the more southern typical *R. perplexa* being only 2–2.5 mm. long. In general, furthermore, the Virginian series shows rather stouter culms and broader channeled leaves, although this tendency is not specially significant. The depressed and round-topped skullcap-like tubercle and the larger and more nearly sessile spikelets sufficiently mark the Virginian series as a relatively northern variety, which is apparently isolated by 150 miles from the northern limit of typical *R. perplexa.* With the material in most of the larger herbaria before her and the rich collections from North Carolina in the herbarium of the University of North Carolina and the very full North Carolina series assembled by Godfrey, Dr. Gale could cite only one collection from the state, that from Columbus County[1] in the southeastern corner of the state, fully 150 miles south of the Virginian area. See pp. 98 and 101.

CLADIUM MARISCOIDES (Muhl.) Torr. To the previously known eastern Virginian stations (along North Landing and Northwest Rivers) add another in PRINCESS ANNE COUNTY: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,233. See p. 100.

SCLERIA MINOR (Britton) Stone. To the few recorded stations, from farther inland, add one in NANSEMOND COUNTY: sphagnous and peaty bog south of Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald & Moore*, no. 15,050. See p. 94.

*CAREX MESOCHOREA Mackenz. SURRY COUNTY: rich low woods west of Claremont, *Fernald & Moore*, no. 15,056.

[1] A glance at the map suggests caution about rushing unprepared into Columbus County for botanizing; at least, the names of two of the villages, Bughill and Redbug, were not bestowed as inducements to tourists.

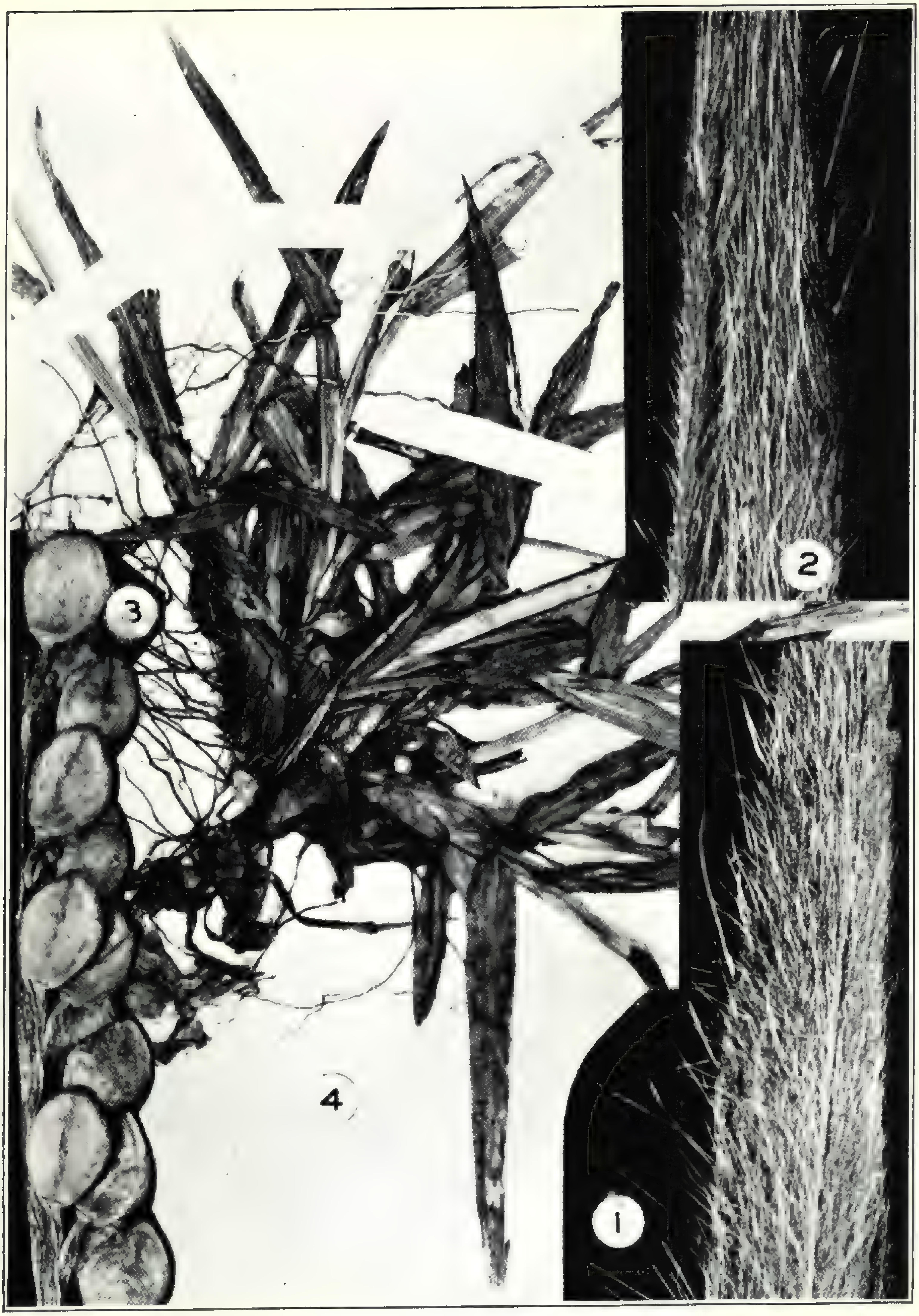

Photo B. G. Schubert

PASPALUM SETACEUM: FIG. 1, lower, and FIG. 2, upper leaf-surface, × 10; FIG. 3, spikelets, × 10.
P. SETACEUM, var. LONGEPEDUNCULATUM: FIG. 4, base of plant, × 1.

Photo B. G. Schubert

PANICUM GLUTINOSCABRUM, all figs. from TYPE: FIG. 1, plant, × $^1/_2$; FIG. 2, axillary autumnal panicle, × 5; FIG. 3, surface of culm, × 10; FIGS. 4 and 5, leaf-surfaces, × 10; FIG. 6, summit of sheath and ligule, × 10; FIG. 7, axis of panicle, × 10; FIG. 8, spikelets, × 10

Not recorded by Mackenzie, in N. Am. Fl., from Virginia. Possibly already known in the state.

C. DECOMPOSITA Muhl. To the scattered stations, all in cypress-swamps, already recorded in James City, Isle of Wight and Southampton add one in SUSSEX COUNTY: on stumps of *Taxodium*, Niblett's Millpond, southwest of Newville, *Fernald & Long*, no. 14,912.

C. HORMATHODES Fernald. To the few known Virginian stations, along the lower James River, add one not far from the North Carolina boundary in PRINCESS ANNE COUNTY: borders of shallow pools in brackish to fresh marsh along Back Bay, Pellitory Point, east of Munden, *Fernald & Moore*, no. 15,053. Less than 5 miles from North Carolina. See p. 95.

C. RENIFORMIS (Bailey) Small. To the single known Virginian station in western Southampton add another in eastern SOUTHAMPTON COUNTY: dry sand of open alluvial flat by Blackwater River, southeast of Unity, *Fernald & Moore*, no. 15,055.

*C. CRINITA Lam., var. BREVICRINIS Fernald in RHODORA, xlviii. 54 (1946). Type from near Rowanta, Dinwiddie County. Many stations in James City, Sussex, Dinwiddie and Brunswick Counties.

C. MITCHELLIANA M. A. Curtis. To the few recorded stations add one in NORFOLK COUNTY: mixed with *Scirpus Olneyi* in fresh tidal reed-marsh along Northwest River below Northwest, *Fernald & Moore*, no. 15,058. See p. 95.

C. DEBILIS Michx., var. RUDGEI Bailey. To the few recorded stations add one in SURRY COUNTY: low rich woods west of Claremont, *Fernald & Moore*, no. 15,061.

*LEMNA VALDIVIANA Philippi, var. ABBREVIATA Hegelm. NORFOLK COUNTY: in a spring at sandy and peaty margin of Lake Drummond, near Jericho Ditch, Great Dismal Swamp, west of Wallaceton, *Fernald & Long*, no. 13,575.

A striking and very extreme variety of the common *L. valdiviana*, its transclucent and veinless fronds broadly elliptic or oval, instead of much narrower. The first in the Gray Herbarium from north of Florida. Hegelmaier described it from tropical South America and Mexico, extending north to Florida and California.

ERIOCAULON DECANGULARE L. To the two recorded stations (in Norfolk and Prince George) add a very extensive one in SUSSEX COUNTY: wet sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, nos. 14,923 and 14,924. See p. 87.

E. Parkeri Robinson. Add a station in Nansemond County: fresh tidal shore of Western Branch, below Everett's Bridge, *Fernald, Long & Clement*, no. 15,238.

Lachnocaulon anceps (Walt.) Morong. Local range extended eastward in Nansemond County: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,239. See p. 99.

Exit Syngonanthus flavidulus.—*Syngonanthus flavidulus* (Michx.) Ruhland stands in our manuals as a Virginian. Nevertheless, the failure during several seasons to find it in the proper habitat, white sands of pine-barren in spring or early summer, has naturally raised doubt as to the record. The species started as *Eriocaulon flavidulum* Michaux, Fl. Bor.-Am. ii. 166 (1803) "Hab. in Carolina." The type-sheet, of which a photograph is before me, bears no record of locality and "Carolina" may have been assumed by L. C. Richard after Michaux's death. At least, Elliott, Sketch Bot. S. C. and Ga. ii. 567 (1824), could do no more than say "In Carolina. Mich. Pursh. I have not met with this species in the low country of Carolina". No Virginian material of it exists in the principal herbaria of the country and the only Carolina specimen in the Gray Herbarium is one without original label, said to have come from Charleston, South Carolina. Certainly Godfrey, in his extensive collecting for the Gray Herbarium in eastern North Carolina, and Godfrey and Tryon, vigorously collecting in eastern South Carolina, did not secure it. In eastern Georgia and in Florida it becomes common in dry to wet sands.

There is, however, little doubt that more than a century ago M. A. Curtis got it in southeastern North Carolina. His *Enumeration of Plants growing spontaneously around Wilmington, North Carolina*, had it entered with doubt, but his "Remark" seems conclusive: "(39) *Eriocáulon flavidulum?* Stem pubescent, 5 grooved; Leaves short, 1–2 inches long; Scales of the involucrum oblong oval, obtuse, lucid. This appears to be Michaux's plant, but I am not certain that it is Elliott's."

Seeking the source of the more northern records, one automatically turns to Pursh, the author of many errors. There is the clue. Pursh, Fl. Am. Sept. i. 92 (1814), obviously rewrote the original Michaux description of *Eriocaulon flavidulum*, changing

Michaux's "culmis . . . 5-striatis" to "scapis . . . subseptem-striatis" and describing the narrowly oblong involucral bracts of Michaux's plant as "squamis involucri suborbiculatis". These alterations at once indicate that Pursh did not have the Michaux species at all; and Pursh's statement of habitat and range clearly show that his 7-striate scape and suborbicular bracts were those of *Eriocaulon Parkeri* Robinson. Here were Pursh's words: "On the banks of rivers, below high-water mark: Pensylvania to Carolina. ⊙. July. *v. v.* From one to two inches high." *E. Parkeri,* found on tidal mud of the Delaware River (well known to Pursh), is in such habitats southward nearly to the North Carolina line but, doubtless, the "Carolina" of Pursh's range was merely borrowed from Michaux. Furthermore, *Syngonanthus flavidulus,* flowering in April and May ("Spr."—*Small*) is very strikingly perennial, with hard or subligneous base; *Eriocaulon Parkeri* is a soft-based plant, strongly simulating an annual, and on the lower Delaware it begins flowering in July. Pursh's "⊙. July" was obviously based upon it. When Elliott stated that *Eriocaulon flavidulum* had not been met by him, he added the misleading "Grows in inundated soils. Pursh." Others continued the confusion, though gradually reducing the northern limit to "Va." or "Va.?"; but Ruhland, in publishing the combination in Engler, Pflanzenr. iv[30], 256 (1903) wisely omitted the Pursh reference and restricted *Syngonanthus flavidulus* to "Carolina, Georgia, Florida", although he could have added Alabama. We may safely drop it from the Virginian list. See p. 86.

*Xyris Bayardi Fernald in Rhodora, xlviii. 56, plate 1007 (1946). Sussex County: wet sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long,* no. 14,922.

A remarkable little annual, the most northern member of the chiefly tropical *Xyris* § *Brevifoliae.* A small area covered by it in 1945, but the breaking of the dam had drained the pond in early 1946 and no evidence of the tiny *Xyris* and of several other species seen in 1945 could be found in 1946, while plants which were scarce in 1945 had increased to relative abundance in 1946. Another and more favorable year will doubtless bring it back, since the seeds must have been well dispersed. See p. 88.

X. flexuosa Muhl. (*X. arenicola* Small). Local range extended farther east in Nansemond County: large stools in

sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,237. See p. 99.

Is Mayaca in the "Manual Range"?—Michaux, Fl. Bor.-Am. i. 26 (1803), described *Mayaca Aubleti* "a Carolina ad Floridam." A few years later Pursh, without mentioning Michaux, cited in his Fl. Am. Sept. i. 32 (1814) *Syena fluviatilis* (Aublet) Willd., based on *Mayaca fluviatilis* Aubl., as growing "In small rivulets of Virginia and Carolina." Later works have credited *M. Aubleti* to both Virginia and Ohio. Both species extend northward into the Coastal Plain of North Carolina: *M. Aubleti* at least to Cumberland County; *M. fluviatilis* to Scotland County. Either of them might be expected, along with other plants of similar range, in southeastern Virginia; but intensive watching of all rills and small branches as well as inundated pond-margins has thus far failed to reveal them. In view of Pursh's well known lack of precision the question naturally arises, whether he may not have seen one of the serpentine and flaccid inundated states of *Lycopodicum inundatum* L., var. *Bigelovii* Tuckerm.[1] such as abound on inundated shores near where Pursh is known to have resided in Southampton County, Virginia, and which so strongly simulate *Mayaca fluviatilis* as to raise the hopes of searchers for the latter. I am aware that in his Aquatic Plants of the United States, 191, map 202 (1944), Muenscher indicates the occurrence of *M. Aubleti* in Virginia and Ohio (on the bases of traditional records) and also in Pennsylvania. Inquiry brings from Dr. Muenscher the statement that he has seen no material from north of the Carolinas. It now becomes important to know if there are actual specimens of either species of *Mayaca* from north of North Carolina. See pp. 86 and 88.

*Juncus scirpoides Lam., var. meridionalis Buchenau. Though known for several years, apparently not definitely recorded as Virginian. Northampton County: moist dune-hollows, Savage Neck, *Fernald, Long & Fogg*, nos. 5263 and 5264. James City County: wet bottomland about 5 miles west of Toano, *Menzel*, no. 80. Princess Anne County: wet peaty depressions in sandy pineland, the Desert, Cape Henry, *Fernald & Long*, no. 3842. Nansemond County: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,240. Amelia County: argillaceous bog about 1 mile north of Winterham, *Fernald & Long*, no. 9018.

Juncus polycephalus not known from Virginia.—Apparently the record of *J. polycephalus* Michx. from Virginia rests

[1] See Fernald in Rhodora, xlvi. 134–136 (1946).

only upon a suggestion made by Engelmann in Gray, Man., ed. 5: 543 (1867). There, Engelmann, considering *J. polycephalus* and some others varieties of an all-inclusive *J. scirpoides* Lam., said under *J. scirpoides* var. *polycephalus* (Michx.) Engelm., l. c. "From North Carolina southward; and may be looked for in Southern Virginia". In the 6th edition of the Manual (by Sereno Watson, whose field-experience had been west of the Rocky Mountains, and by Coulter, who had early done some exploring in the Rocky Mountains) the tentative phrase was omitted and the range given as "S. Va. to Fla., west to Mo. and Tex."; and the extension northward to southern Virginia was trustingly retained in the 7th edition. In 1895, however, Coville, in his detailed study of the section, Bull. Torr. Bot. Cl. xxii. 302–305, showed that the *J. polycephalus* of most authors was at least two species: *J. polycephalus* (true), extending north only into North Carolina; *J. validus* Coville, the plant of Arkansas (and Missouri). Since, however, true *J. polycephalus* comes north to Tyrrell County on the southern side of Albemarle Sound in northeastern North Carolina (10 miles north of Fairfield, *Godfrey*, no. 4337), only 45 miles south of the tidal marshes and savannas of Northwest and North Landing Rivers and of Back Bay (northern extensions of Albemarle Sound), Engelmann's surmise may yet be justified. "Here's hoping". [1]

Juncus polycephalus was reported from various stations on the coast of Worcester Co., Maryland by Rev. Paul J. Redmond in his Flora of Worcester County Maryland, Contrib. Biol. Lab. Cath. Univ. Am. no. 11: 74 (1932). Dr. Hugh O'Neill writes me, however, that the material deposited at the Catholic University was destroyed by fire and there is serious doubt of the identification. He personally knows the region and has never seen *J. polycephalus* there.

J. CANADENSIS J. Gay, forma CONGLOBATUS Fernald. To the single Virginian station cited (in Brunswick County) add one in

[1] Generally *Juncus polycephalus* has simple globose heads of flowers. In Scotland County, North Carolina there occurs a plant like it in every way except that its heads are strongly lobulate, each head consisting of 2–5 subellipsoid and elongate crowded spikes. Since the parallel variation in *J. scirpoides* Lam. (var. *meridionalis* Buchenau) occurs as uniform colonies, not as sporadic individuals, the similar variation in *J. polycephalus* is presumably a variety rather than a form. I am calling it

JUNCUS POLYCEPHALUS Michx., var. **schizocephalus**, var. nov., a var. typica recedit capitibus lobulatis lobis elongatis.—NORTH CAROLINA: shallow stream, 15 miles north of Laurinburg, July 14, 1938, *Godfrey*, no. 5050 (TYPE in Herb. Gray.).

Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,242.

J. canadensis, var. euroauster Fernald. To the stations (in Princess Anne, Norfolk, Sussex, Henrico and Greensville) originally cited add one in Southampton County: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,241. See p. 101.

Zigadenus densus (Desr.) Fernald in Rhodora, xlii. 245 (1940).

As noted on p. 93 the very few and small plants of a few years ago, at the only known Virginia station, the little sphagnous bog northwest of Dahlia in Greensville County, have been stimulated by burning-off of the bog. The plants in June, 1946, numbered 25. Although the herbarium-specimens from farther south justify Small's measurement of the "raceme cylindric, 5–10 cm. long, about ½ as thick" (as *Tracyanthus angustifolius* (Michx.) Small), the larger stimulated plants had the simple or basally branching racemes up to 4 dm. long and 5 cm. thick, the plants reaching a height of 1.65 m., instead of stopping at Small's maximum of 1 m. (10 dm.).

*Stenanthium gramineum (Ker) Morong, var. micranthum Fernald in Rhodora, xlviii. 148, plate 1041 (1946). Occurring from western Virginia along the mountains to northwestern Florida and Alabama. I have seen Virginia material from Augusta County: at 540 m. alt., ridge of Little North Mountain, vicinity of Stribling Springs, *Steele*, no. 49.

Allium vineale L. occurs as three often well defined forms. Typical *A. vineale* has the umbel of numerous bulbs mixed with flowers; forma *capsuliferum* (Koch) Asch. & Graebn. is nearly or quite without the bulbs but has very many fertile flowers; forma *compactum* (Thuill.) Asch. & Graebn. has the umbel wholly of bulbs. All three occur in eastern Virginia (unfortunately). Besides typical *A. vineale* I have before me

*Allium vineale L., forma capsuliferum (Koch) Asch. & Graebn. Elizabeth City County: Hampton, *A. B. Seymour*, no. 19. James City County: Williamsburg, *Grimes*, no. 3787. Brunswick County: bottomland of Pope Creek, southeast of Ebony, *Fernald*, no. 14,591. Mecklenburg County: old field, north of Clarksville, *F. R. Fosberg*, no. 15,461.

*A. vineale L., forma compactum (Thuill.) Asch. & Graebn. Norfolk County: "Western Branch, Julio 1840", *F. Rugel*.

Lilium Michauxii Poir. To the few and scattered stations on the Coastal Plain of Virginia add the following. Prince George County: several large plants in argillaceous and boggy depression north of Gary Church, *Fernald & Moore*, no. 15,072. Dinwiddie County: small and single-fruited plants in flat pineland slightly south of Petersburg, *Fernald, Long & Clement*, no. 15,245. Sussex County: a single large plant at foot of roadside fill bordering a swampy depression in sandy pinelands 3 to 4 miles northwest of Waverly, *Fernald, Long & Clement*, no. 15,245—perhaps travelling by car; if so, preferable to most adventives.

Hypoxis micrantha Pollard. To the very few Virginian stations add another in Nansemond County: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,248. See p. 99.

Iris prismatica Pursh, var. **austrina,** var. nov., foliis surculorum 5–9 mm. latis valde sulcato-costatis, valvis spathae firmis subcoriaceis brunneis vel viridescentibus, flore 8–10 cm. lato, tubo perianthii 5–6 mm. longo, sepalis spathulato-obovatis lamina cuneata, seminibus 4–6 mm. longis.—Acid swamps, wet barrens and shallow pools, mountains of Tennessee and North Carolina to Georgia, east to the Piedmont and Coastal Plain of southeastern Virginia and North Carolina. Virginia: wet depression in pineland 3 to 4 miles northwest of Waverly, July 26, 1936, *Fernald & Long*, no. 6170, June 7, 1946, *Fernald & Moore*, no. 15,074 (type in Herb. Gray, isotype in Herb. Phil. Acad.), September 9 and 11, 1946, *Fernald, Long & Clement*, no. 15,250; wet ground along railroad, Ashland, May 26, 1932, *H. B. Meredith;* Richmond, May, 1838, collector not stated, May 10, 1894, *J. R. Churchill;* low, wet open woods and marshes, Westwood Golf Course, near Richmond, 1931, *C. Thompson;* exsiccated argillaceous swale, Libbie Avenue, Westhampton, June 21, 1936, *Fernald, Long & Smart*, no. 5735. North Carolina: moist, acid, sandy soil, between Bunn and Wake Forest, Franklin County, May 27, 1937, *Blomquist*, no. 9257; wet meadows near Hendersonville, Henderson County, May 26, 1898, *Biltmore Herb.* no. 2596[a]. Georgia: Butler, Taylor County, August, 1877, *H. M. Niesler*. Tennessee: abundant in grassy swamp, oak barrens, alt. 1100 ft., Tullahoma, Coffee County, August 24, 1930, *Svenson*, no. 4269; flowering specimen raised from seed of latter, grown at Brooklyn Botanic Garden, June 6, 1933, *M. Putz;* wet barrens along road between Tullahoma and Manchester, May 18, 1937, *Svenson*, no. 10,259.

Typical *Iris prismatica*, described by Pursh from New Jersey, occurs most often on brackish to saline (sometimes fresh) marshes, sands, shores or meadows along the coast from north-

eastern Maryland and Delaware to southern Maine, with a few stations inland to 30 miles from salt water and an isolated area on salt marshes of eastern Cape Breton, 600 miles northeast of its northeastern limit in New England. The distinctive characters which separate the southeastern and inland var. *austrina* of fresh acid marshland are summarized below:

I. prismatica: leaves terminating new stolons 2–5 mm. wide, shallowly or obscurely corrugated; valves of spathe pale brown, wholly or partly scario-membranaceous, the outer one rarely foliaceous; flower 5–7 cm. broad, with perianth-tube about 3 mm. long; blade of sepal ovate or obovate to roundish, 1.3–2 cm. broad, rather abruptly contracted to the broad claw; faces of capsule 6–14 (av. 9.6) mm. broad; seeds 3–4 mm. long.

Var. austrina: leaves terminating new stolons 5–9 mm. wide, deeply corrugate-sulcate; valves of spathe firm or subcoriaceous, either brown, or green and foliaceous; flower 8–10 cm. broad, with perianth-tube 5–6 mm. long; sepals spatulate-obovate, 1.2–1.7 cm. broad, the blade gradually tapering into the slender-based claw; faces of capsule 10–14 (av. 12.5) mm. broad; seeds 4–6 mm. long.

It is probable that *Iris prismatica*, var. *austrina* is the phylogenetic progenitor of the more northern and semi-halophytic *I. prismatica;* var. *austrina*, spreading out from the ancient Appalachian Upland to the younger Coastal Plain and there giving rise to the more northern and coastwise smaller plant which, in its extreme isolation on Cape Breton, suggests a northern migration along the now submerged continental shelf, such as we find in many plants which are isolated from the South in various parts of Nova Scotia.

Sisyrinchium capillare Bicknell. To the single recorded Virginia station (in Sussex County) add an extensive one in Nansemond County: sphagnous and peaty bog south of Norfolk and Western Railway, about ½ mile west of the brickyard, Kilby, *Fernald & Moore*, no. 15,075.

In fully ripe (or over-ripe) fruit on June 8, the stiff and wiry, very slender scapes inclined to spiral and with a bronzy or metallic luster. See p. 94.

*Canna indica L. Princess Anne County: two slender purplish plants naturalized at border of swampy woods near Pungo, *Fernald & Long*, no. 10,596.

The Identity of Isotria medeoloides.—*Isotria medeoloides* (Pursh) Raf. Fl. Tellur. iv. 47 (1838) rests on *Arethusa medeoloides* Pursh, Fl. Am. Sept. ii. 591 (1814). Under *Arethusa* Pursh's no. 5 was *A. verticillata* Willd. (i. e. Muhl. ex Willd.) with the description copied largely from Willdenow's original,

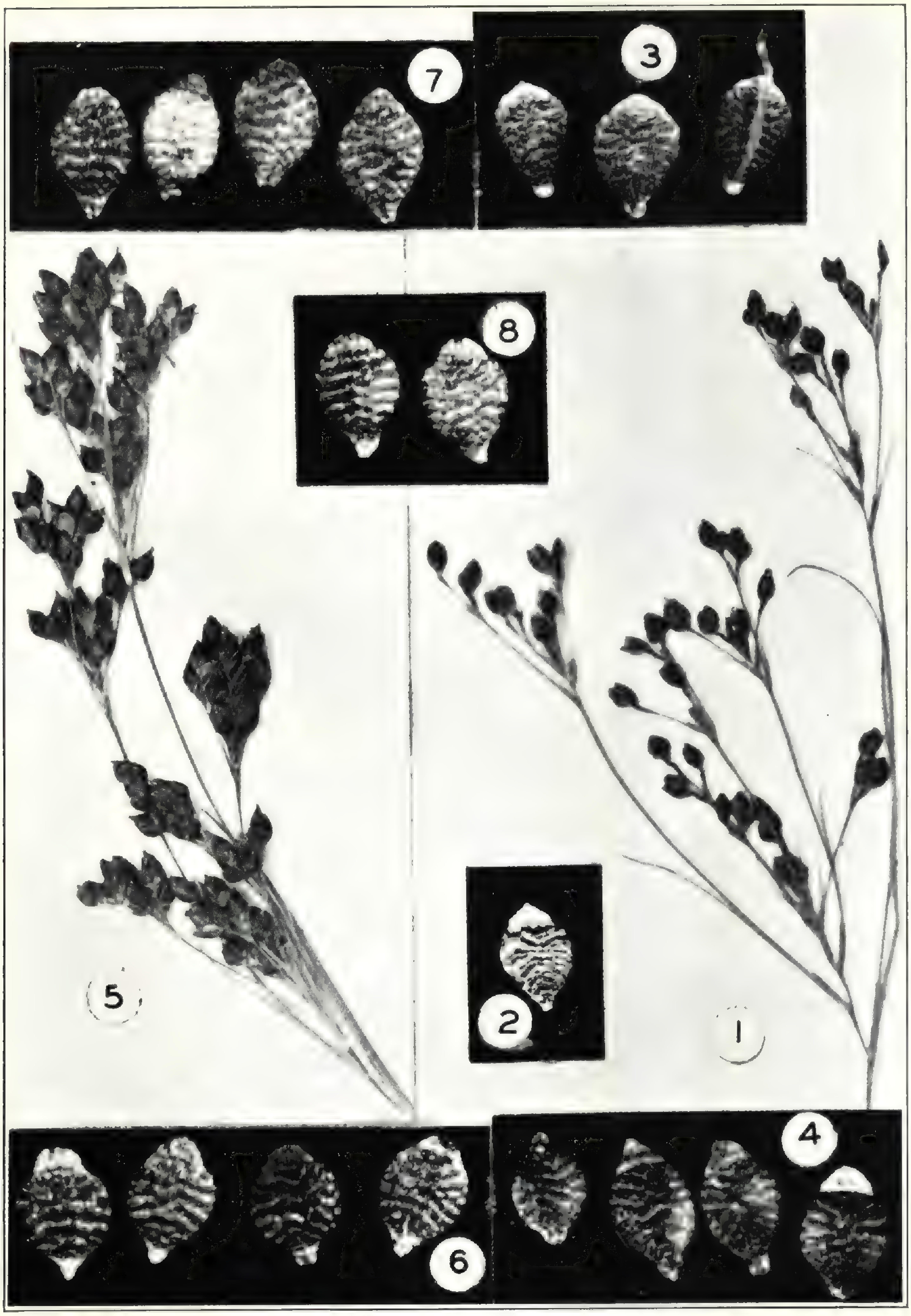

Photo B. G. Schubert

RHYNCHOSPORA PERPLEXA: FIG. 1, terminal corymb, × 1.8, from ISOTYPE; FIGS. 2–4, achenes, × 10.
Var. VIRGINIANA: FIG. 5, terminal corymb, × 1.8, from TYPE; FIGS. 6–8, achenes, × 10.

After photo. by H. E. Moore

NYMPHAEA ODORATA, var. STENOPETALA: "Water-nymphs in the G. D. Swamp."

"petalis tribus exterioribus longissimis linearibus" but adding "interioribus lanceolatis", the "flowers . . . of a dull purple mixed with yellow". This was a perfectly good characterization of *Isotria verticillata* (Muhl.) Raf., which Morris & Eames, Our Wild Orchids, 221 (1929), describing from fresh material, assign "SEPALS . . . brownish above, linear, spreading and recurved, 2 in. long . . . PETALS: yellow-green, nearly 1 in. long, lanceolate", the flowers "on long pedicels (½–1¾ in. long)". Beautiful drawings of the flower, with its very long sepals and long peduncle, and of the long-peduncled fruit will be found in Mrs. Ames's plates 105 and 106 in Ames, Orchidaceae, vii. (1922). They are, of course, shown in very many other illustrations.

Immediately following *Arethusa verticillata*, Pursh described his new species, *A. medeoloides:*

> 6. A. foliis verticillatis oblongis acuminatis, caule unifloro, flore subsessili, petalis tribus exterioribus linearibus, interioribus brevioribus oblongis obtusis, labello petalis consimile. *medeoloides*
>
> In shady woods on the Blue-mountains. *Vanvleck.* ♃. July. *v. s. in Herb. Vanvleck.* Resembles the preceding in general habit.

The subsessile (instead of long-stalked) flower is altogether too suggestive of the "*peduncle much shorter than the ovary and pod*" of the original description of *Pogonia affinis* Austin in Gray, Man. ed. 5: 507 (1868), Austin having supplied Gray with the contrasts, so that the description, immediately preceding, of *Pogonia verticillata* (Muhl.) Nutt. contained the supplementary note: "Stalk of pod about 1½′ long, more than half the length of the leaves". Mrs. Ames's accurate drawings in Ames, l. c., plate 107, of *Isotria affinis* (Austin) Rydberg definitely show the "flore subsessili" of Pursh's account, as do the fine photographs (plates 70 and 71) of Morris & Eames; while Pursh's "petalis . . . interioribus brevibus oblongis obtusis" are well shown in Mrs. Ames's figs. 1, 2 and 5.

Pogonia affinis was found by Austin in "Southern New York and Northern New Jersey", the specimen sent to Gray coming from Closter, New Jersey. In 1889, Cat. Pl. N. J. 233, Britton

listed it from stations in Bergen and Mercer Counties. House cites it for Rockland and Washington Counties (to which stations on Long Island could be added) in New York, and Porter listed three counties for it in eastern Pennsylvania, including Monroe, at the Delaware Water Gap, where the Delaware River cuts through the Kittatinny or Blue Mountains. Pursh's *Arethusa medeoloides* was from the "Blue-mountains", collected by Vanvleck. The Blue Mountains of Vanvleck's region were what are now known as the Kittatinny Mountains of southeastern mainland New York, northwestern New Jersey and eastern Pennsylvania (Lippincott's Gazetteer), just the region where *Pogonia affinis* has been collected. I can not bring myself to discard *Isotria medeoloides* as a pure synonym of *I. verticillata*, as I find it treated by recent students of the orchids. Whatever his inaccuracies and irregularities certainly were, Pursh did not, like Rafinesque and some others, often describe the same species twice on the same page. I am replacing the later name, *Isotria affinis* (Austin) Rydberg, by the much earlier I. MEDEOLOIDES (Pursh) Raf. A number of Virginia stations in JAMES CITY COUNTY.

*SPIRANTHES TUBEROSA Raf., var. GRAYI (Ames) Fernald in RHODORA, xlviii. 189 (1946). HENRICO COUNTY: dry rocky woods, campus of University of Richmond, September 21, 1934, *Alice Ryland.*

As pointed out by me, in RHODORA, l. c. 6 and 10 (1946), the plant which has erroneously passed as *Spiranthes Beckii* Lindl. (1840) must be called *S. tuberosa* Raf. (1833). Somewhat later, pp. 189–192, it was shown that typical *S. tuberosa*, common in eastern Virginia and southward, has a 1-sided or essentially secund spike, its flowers rather distant and not very strongly overlapping. In New England, south rarely to Virginia, var. *Grayi* occurs, the spike definitely spiraling, its numerous close spirals with crowded flowers.

*S. LACERA Raf. PRINCESS ANNE COUNTY: clay ditches bordering pine woods, Virginia Beach, *Fernald & Long*, no. 3873; sandy pineland, Cape Henry, *Fernald, Griscom & Long*, no. 4618; both distributed as *S. gracilis.*

For detailed discussion and illustration see Fernald in RHODORA, xlviii. 5 and 6–9, plate 993 (1946).

LIPARIS LILIFOLIA, not L. LILIIFOLIA.—The plant which regularly passes as *Liparis liliifolia* and as of "(L.)" Richard ex Lindl. in Bot. Reg. xi. sub pl. 882 (1825) started in L. Sp. Pl. 946 (1753) as *Ophrys lilifolia.* The name was not from *Lilium,* as often inferred and which would be almost absurd as applied to our small scapose plant with two or three basal leaves, but apparently from *Lilia,* the name of a class of plants chiefly with one to few basal leaves set up by Gmelin in 1747 for such genera as *Convallaria, Hemerocallis, Erythronium,* etc. Had Linnaeus followed the pattern for most such names he would have used the connective *ae* but in this case he definitely did not do so. His *Ophrys lilifolia* was from "Virginiae, Canadae, Sueciae", the type being a Virginian specimen from Clayton, who discovered the species on May 26, 1741 ("Die 26. Maji Anni 1741 florentem inveni"—Clayton in Gron. Fl. Virg. pars 2: 185 (1743)), an item such as one rarely finds in this early work. Linnaeus clinched the Virginian plant as his type through his description: "*Planta* virginica *sexies major nostrate* [*Sueciae*], *at structura eadem, notabilis flore: petalis exterioribus linearibus.*" Through three editions of Species Plantarum (ed. 3 in 1764) and through many editions of his Systema, Linnaeus consistently had *Ophrys lilifolia,* although in late editions he frequently altered the spellings used for names in his first editions. In Syst. Nat. ed. 12, ii. 592 (1767), it got printed, doubtless through a *lapsus calami,* as *O. linifolia.*

Index Kewensis has under *Ophrys "lilifolia,* Linn. Sp. Pl. 946 = Liparis liliifolia", the original spelling not being maintained under *Liparis.* The first transfer of *Ophris lilifolia* to another genus seems to have been as *Malaxis liliifolia* Swartz in Vet. Akad. Nya Handl. Stockh. xxi. 235 (1800), this starting the spelling with the double *ii,* as if the name came from *Lilium.* After that authors varied, some using correctly the original form but being cited by the less careful as doing just the opposite! Thus, although Robert Brown in Ait. f. Hort. Kew. ed. 2, v. 208 (1813) had it correctly as *Malaxis lilifolia,* when the plant was put into *Liparis* as *L. liliifolia* Richard ex Lindl. l. c., Lindley cited as synonyms, not the Linnaean reference at all but "Ophrys liliifolia, *Bot. rep.*" and "Malaxis liliifolia. *Br. in Ait. Kew. ed. 2.*" Nevertheless, Andrews, Bot. Repos. i. pl. LXV (1797), had it,

with absolute correctness, as *O. lilifolia* and Robert Brown, following the original spelling, had *Malaxis lilifolia.* The change of spelling, started apparently by Swartz, continued by Willdenow and repeatedly carried on by Lindley and his trusting followers, has been regularly accepted by more recent students of the orchids, who have found that course much easier than the time-consuming and exacting tracing of the name to its source.

Hexalectris spicata (Walt.) Barnh. Local range extended eastward into Nansemond County: rich sandy and loamy oak and hickory woods just east of Suffolk, *Fernald, Long & Clement,* no. 15,251, the plants well fruiting. Station indicated to us by Mr. Leslie Hubricht. See p. 96.

*Carya ovalis (Wangh.) Sarg., var. hirsuta (Ashe) Sarg. Southampton County: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, *Fernald & Long,* no. 8232. Large trees with flakey and shallowly furrowed bark. Extension from North Carolina.

*Alnus serrulata (Ait.) Willd., forma noveboracensis (Britton) Fernald in Rhodora, xlvii. 358, plate 985 (1945). Specimens cited from Princess Anne, Southampton, and Greensville Counties.

*A. serrulata, var. subelliptica Fernald, l. c. plate 986 (1945). Specimens cited from Nansemond and Charlotte Counties.

*A. serrulata, var. subelliptica, forma mollescens Fernald, l. c. 359, plate 988 (1945). Specimen cited from Princess Anne County.

*A. serrulata, var. subelliptica, forma nanella Fernald, l. c. 360, plate 989 (1945). Specimens cited from Brunswick (type) and Prince George Counties.

Quercus alba L. occurs in three pronounced forms (by Sargent treated as varieties). Typical *Q. alba* has the leaves with median portion of the blade only 0.5–2.5 cm. broad, the longer of the 4–10 narrowly oblong entire to slightly lobulate or apically cut lobes 2.5–8 cm. long and 0.8–2 (rarely –3) cm. broad. Forma *latiloba* (Sarg.) Palmer & Steyerm. (var. *latiloba* Sarg.) has the blades usually cleft less than half-way to the midrib, the round-tipped broadly oblong lobes 1.5–4 cm. broad. Forma *repanda* (Michx.) Trel. (var. *repanda* Michx.) has a shallowly sinuate margin, the rounded lobes as broad as long. They all occur in Virginia. The following specimens from the Coastal Plain or near it are characteristic.

QUERCUS ALBA L. (typical, i. e. *Q. alba pinnatifida* Michx. f.), the type from Virginia. NORFOLK COUNTY: Norfolk, *Rugel.* SOUTHAMPTON COUNTY: south of Berlin, *Fernald & Long.* no. 7409; near Nottoway River, Carey Bridge, *F. & L.*, no. 10,016. DINWIDDIE COUNTY: northeast of Burgess, *F. & L.*, no. 8236.

*Q. ALBA, forma LATILOBA (Sarg.) Palm. & Steyerm. HENRICO COUNTY: Chickahominy Swamp, 6 miles north of Richmond, *L. F. Randolph & P. Merriman*, no. 255.

*Q. ALBA, forma REPANDA (Michx.) Trel. SUSSEX COUNTY: by Nottoway River, southwest of Lamb's, *Fernald & Long*, no. 12,998.

*× Q. BEADLEI Trel. (*Q. alba × Michauxii*). PRINCESS ANNE COUNTY: large tree, south of Seatack, *Fernald & Long*, no. 3902, distributed as *Q. Prinus.* Present identification by E. J. Palmer.

*Q. VIRGINIANA Mill., var. MARITIMA (Chapm.) Sargent. PRINCESS ANNE COUNTY: sandy pineland, Cape Henry, *Fernald & Griscom*, no. 4383; sand-dunes, Cape Henry, *Fernald, Long & Fogg*, no. 4864.

Typical *Quercus virginiana*, either as a tall tree or a shrub, has inconspicuous veins, Var. *maritima*, a shrub or low tree, has the veins deeply impressed into the upper surface of the leaf and prominent and inclined to be obviously reticulated beneath.

QUERCUS VELUTINA Lam., as shown by me in Journ, Arn. Arb. xxvii. 386 et seq. (1946), was based on an unusual (perhaps juvenile) extreme with obovate and only very shallowly lobulate leaves. I have not seen it from Virginia. In Virginia three strongly marked forms occur: forma *macrophylla* (Dippel) Trel., with the blades cut less than half-way to the midrib and with broadly oblong, toothed lobes many times broader than the slender sinuses; forma *dilaniata* Trel., with the blade having round-based sinuses extending half-way to three fourths to the midrib, and the oblong terminally toothed lobes often narrower than the broader sinuses; and forma *pagodaeformis* Trel., with the long blade with deep and very broad round-based sinuses and the long, mostly acuminate lobes subentire or only slightly toothed. Representative Virginian specimens are here noted.

*Q. VELUTINA Lam., forma MACROPHYLLA (Dippel) Trel. FAUQUIER COUNTY: Bull Run Mountains, *Allard*, nos. 9328 and 9741. GILES COUNTY; Beanfield Mt., alt. 3350 feet, west of Mountain Lake P. O., *Fogg*, no. 12,894.

Q. VELUTINA, forma DILANIATA Trel. The commonest form, generally passing as true *Q. velutina.* FAUQUIER COUNTY: Bull Run Mountains, *Allard*, nos. 1685 and 2601. SHENANDOAH

County: Massanutten Range, *Allard*, no. 5578. Lee County: Cumberland Gap, July 27, 1892, *Small*. Henrico County: campus of University of Richmond, *M. M. Ryland*.

*Q. velutina, forma pagodaeformis Trel. Bedford County: October, 1871, *A. H. Curtiss*.

*× Q. garlandensis E. J. Palmer (*Q. falcata* × *Q. nigra*). Princess Anne County: large tree near landing, Ragged Island, *Fernald & Long*, no. 12,323, erroneously distributed as × *Q. ludoviciana* (see next entry). Identification by Mr. Palmer.

× Q. ludoviciana Sargent (*Q. falcata* × *Phellos*). This hybrid, erroneously reported on the basis of the preceding no., retains its place in the Virginian flora through another collection. Princess Anne County: dry woods and thickets, Lynnhaven, *Fernald & Long*, no. 3901, erroneously identified as *Q. imbricaria*. Identification corrected by Mr. Palmer.

*× Q. Rudkini Britton (*Q. marilandica* × *Phellos*). James City County: 1½ miles northwest of Williamsburg, *Grimes*, no. 3186.

Q. hemisphaerica Bartr. ex Willd. See Fernald in Rhodora, xlviii. 142–145, plates 1035 and 1036 (1946). *Q. laurifolia* sensu many auth., not Michx. The following specimens of this semi-evergreen species are before me from Virginia. Princess Anne County: swamp, West Neck Creek, west of Pungo, *L. F. and Fannie R. Randolph*, no. 518, as *Q. Phellos;* border of gum swamp west of Pungo, *Fernald & Long*, no. 4861, as *Q. Phellos*, var. *laurifolia*. Southampton County: many fine, fruiting, large trees with drooping branchlets, sandy woods near Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,254. See p. 102.

*Rumex Acetosella L., var. pyrenaeus (Pourr.) Timbal-Lagrave. Dinwiddie County: roadsides and waste places, Petersburg, *Fernald & Long*, no. 11,561.

Var. *pyrenaeus* is the coarsest variety of the ubiquitous weedy species, up to 7 dm. high; its basal hastate leaves with terminal lobe obovate or elliptic, usually rounded or blunt at apex and up to 3 cm. broad.

*Polygonum aviculare L., var. vegetum Ledeb. James City County: cultivated ground, Williamsburg, *Grimes*, no. 3916. Sussex County: clearings, borders of dry woods and roadsides east of Stony Creek, *Fernald & Long*, no. 8248. Southampton County: roadsides and dry fields, Franklin, *F. & L.*, no. 9915.

Presumably of general occurrence as a weed.

*P. Persicaria L., var. angustifolium Beckhaus. Dinwiddie County: cinders of freight yard of Norfolk and Western Railway, Petersburg, *Fernald & Long*, no. 10,630.

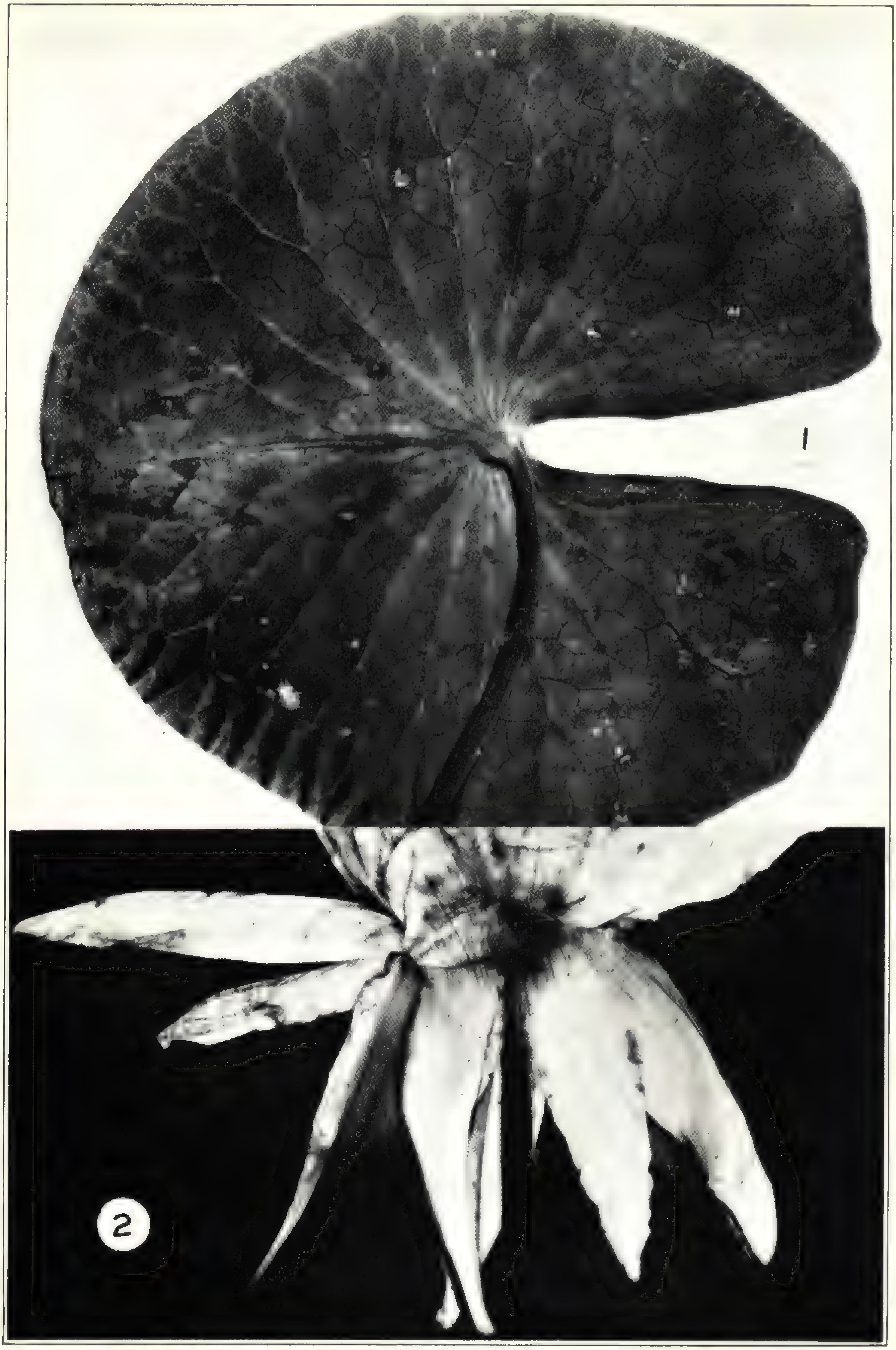

Photo B. G. Schubert

NYMPHAEA ODORATA, var. STENOPETALA: FIG. 1, lower surface of leaf, × 1; FIG. 2, base of flower, showing reflexed sepals, × 1.

Photo B. G. Schubert

NYMPHAEA ODORATA, var. STENOPETALA: FIG. 1, dorsal and FIG. 2, ventral view of flower, × 1.

The narrowest-leaved extreme of the species, with lance-linear leaves only 3–5 mm. wide, strigose on both faces; bristle-like cilia of ocreae half as long as the strigose sheath.

*P. Persicaria, var. ruderale (Salisb.) Meisn. Arlington County: abundant near greenhouses, Arlington Farm, *Allard*, no. 3887, distrib. as *P. mite.*

A prostrate or matted extreme, with oblong- or narrowly rhombic-lanceolate blunt to acutish (scarcely acuminate) often scabrous leaves, the primary ones only 2–5 cm. long; ochreae short-ciliate; spikes short-cylindric to subglobose, 0.5–1.5 cm. long, short-peduncled to sessile.

P. sagittatum L., var. gracilentum Fern. Range extended south from tidal marshes of the Chickahominy to the tidal reed-marshes of southeastern Virginia (almost in North Carolina). Princess Anne County: along Blackwater Creek, below Blackwater, *Fernald & Long*, no. 14,935. Norfolk County: along Northwest River below Northwest, *F. & L.*, no. 14,934. See p. 90.

*Nymphaea odorata Ait., var. **stenopetala,** var. nov. (tab. 1061–1063), a var. typica recedit pedunculo vix flexuoso flore super aquam elevato; sepalis petalisque lanceolato-acuminatis 0.8–1.5 cm. latis, sepalis reflexis.—Nansemond County, Virginia: canal at northern border of Great Dismal Swamp, east of Magnolia, June 10, 1946, *Fernald & Moore*, no. 15,086 (type in Herb. Gray.; isotype in Herb. Phil. Acad.)

Typical *Nymphaea odorata* (including var. *minor* Sims) has the peduncle, to quote Conard's account, "usually slender and weak", the flowers resting directly on the water, although Conard cites one collection from shallow water in which "the peduncles may be rigid and bear the flowers 15 cm. above the water (Sugar Hollow Pond, Danbury, Conn.)". The sepals of typical *N. odorata* are described by him as "ovate to lance-ovate, rounded at summit . . . Outside green, more or less shaded with reddish-brown or red". The outer petals are similarly "ovate to elliptic-lanceolate, apex obtuse or rounded"; and for his typical *N. odorata* he gives the sepals a breadth of 2.1–2.5 cm., the petals of 1.75–2.2 cm., although the smallest extreme (var. *minor*) may have sepals down to 1.04 cm. broad, this dwarf form having a weak peduncle "only half supporting the flower even when the plant has no water around it". The much larger *N. odorata*, var. *gigantea* Tricker, with petals "ovate or obovate, broadly rounded at apex" has the sepals 2.4–3.6 cm. broad, the outer petals 2–2.8 cm. broad.

Var. *stenopetala* is very striking, its leaves floating, deep purple beneath and veined (PLATE 1062, FIG. 1) as in typical *N. odorata*, but the flowers stand well above them, on stiff erect peduncles (PLATES 1061 and 1062, FIG. 2). The narrow (lance-acuminate) sepals, with drab- or fuscous-green backs, are strongly reflexed in anthesis, pointing down toward the water, and the lance-acuminate narrow petals are quite unlike those of typical *N. odorata* and of var. *gigantea*. In mid-September, after weeks of relatively dry weather, var. *stenopetala* was nearly all shrivelled and not to be seen. Only a few small pools exhibited it and in these Mr. Long and I could find no fruits. The plant is presumably widely distributed in the Great Dismal Swamp, See p. 94.

*ITEA VIRGINICA L., forma ABBREVIATA Fern. in RHODORA, xlix. 22 (1947). SOUTHAMPTON COUNTY: peaty and sandy shore of Whitefield's Millpond, southwest of Corinth, *Fernald & Moore*, no. 15,094.

In September, when Mr. Long and I visited the spot we found that the shrub, along with all its associates near the dam, had been cut off. We shall have to wait for fruiting material until another year.

(*To be continued.*)

HERMAN C. BENKE.—Mr. Herman C. Benke, well-known amateur botanist, died in his home December 9 of a heart attack at the age of 77.

Mr. Benke was a keen observer of plants, and devoted most of his spare time to the study of the local flora, especially of Wisconsin, Illinois, and northern Indiana. In his earlier years he was a teacher of geography and science in various schools in Wisconsin. After his retirement, he supported himself by the use of his camera and became a professional photographer. In his spare time he collected assiduously, especially around Crystal Lake and Elgin, Illinois, and Manitowoc, Wisconsin, in which region he was thoroughly at home.

Although he was interested in all the plants of the local flora, he became particularly absorbed in a study of the family *Compositae*, especially the genus *Aster*. He took an especial interest in the color variations of the plants, and discovered many new color forms previously unknown to science. A few of these were

described by him or bear his name, testifying to his discovery of them.

He was a contributor of newspaper articles on the local flora, autumn coloration, preventives and treatment of poison ivy and poison sumach effects, besides a varied mass of botanical information gleaned from his personal experience.

His enthusiasm to travel and explore for plants was so great that he sold his Kansas farm, which he had inherited many years ago, in order to defray expenses for a botanical trip to Texas, Louisiana, and Florida. While the greater portion of his specimens were collected in Illinois, Wisconsin, Kansas, Indiana, Michigan, Texas, Louisiana, Florida, Missouri, and Arkansas, he found time to botanize in California and Mexico as well. Altogether he visited 32 states.

A large and complete collection is in the herbarium of the Chicago Natural History Museum, amounting to many thousand specimens, the result of his many years of enthusiastic botanizing.

Mr. Benke not only will be remembered for his many contributions to knowledge of the flora of the United States, especially of the central states, but also for the part he played in conservation of the native flora and fauna. He was responsible for getting the natural stand of Arbor Vitae (*Thuja occidentalis*) preserved and made into a sanctuary at Elgin, known as Trout Park or Elgin Botanical Garden. This is one of the few localities known in Illinois where this species is still growing wild.—JULIAN A. STEYERMARK, Chicago Natural History Museum.

A FLORA OF KALAMAZOO COUNTY.—CLARENCE R. and FLORENCE N. HANES have for several years been assiduously collecting and studying the plants of their county. Not only that; they have supplied material to more than a score of specialists in order to gain their identifications in technical groups. Their results are now assembled in a beautifully made volume[1]. The occurrence within the county is stated in some detail and the introductory pages give a clear and very interesting discussion of the soil-conditions and other environmental factors within it and bordering counties[2]. Such a carefully prepared and documented flora is a great

[1] HANES, CLARENCE R. AND FLORENCE N., Flora of Kalamazoo County, Michigan. Vascular Plants, pp. xii + 295, 14 full-page plates (too modestly called "figs.") Schoolcraft, Michigan, Clarence R. Hanes. $4.00.

[2] The present writer is specially glad to be made conscious of the location of Kalamazoo. Before the International Botanical Congress of 1930 he was studying at the British Museum of Natural History, where hundreds of delegates drifted in before the opening of the congress. He was asked by his British colleagues to act as a sort of

credit to its authors. Naturally, leaning for support upon specialists, who often emphasize distinctions in their own groups which they would discount in those less intensively studied, there is some irregularity in relative evaluation of genera. That is to be expected where different conceptions of genera come in. In these cases the alternative generic name is given in synonymy. Sometimes a healthy and very general skepticism is expressed; for instance: "*Crataegus* is a difficult genus and there is a question whether a satisfactory treatment of it can ever be made. At least we are not entirely satisfied with several of the species given in our list."

The illustrations show in fine detail several local representatives of *Rubus*, these all new species of L. H. Bailey, and the frontispiece is from a beautiful photograph of Frostweed (*Helianthemum canadense*), showing vividly the icy films which shoot out from the base on a frosty morning. Altogether the new Flora is very gratifying. It takes its place with those of Deam, Wiegand & Eames, and others who have gone to great pains to make their work authentic.—M. L. F.

"host" to Americans and to see that they were introduced to their true hosts. One day the late Professor William E. Praeger of Kalamazoo College came in. Greeting him as an old friend, I asked: "Ypsilanti?", receiving the prompt reply, "No. Kalamazoo!" "Is that American Indian you are talking?" asked the British bystanders, to whom Praeger responded: "Where is your boasted knowledge of Greek? Ypsilanti was a Greek hero!"

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Gray Herbarium of Harvard University, Cambridge 38, Mass.

Photo B. G. Schubert

RUBUS HYPOLASIUS, figs. from TYPE: FIG. 1, portion of primocane, × 1; FIG. 2, upper, and FIG. 3, lower surface of leaf, × 10.

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Rubus hypolasius, both figs. from type: fig. 1, branch of floricane, × ⅓; fig. 2, upper surface of leaf, × 10.

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ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

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(Continued from page 142)

RUBUS CELER Bailey. Range extended south from Arlington and Fairfax Counties to NANSEMOND COUNTY: border of ditch, northern border of Great Dismal Swamp, east of Magnolia, *Fernald & Moore*, no. 15,098. See p. 95.

*R. (§ FLAGELLARES) **hypolasius,** sp. nov. (TAB. 1064–1066), a *R. flagellare* differt primocannae aculeis rectis horizontaliter divergentibus 4–6 mm. longis; primocannae foliis subtus molliter pilosis supra sparse pilosis; floricannae foliis subtus pilosis; pedicellis pilosis, pilis patentibus, longioribus 1–4 cm. longis.—Sussex County, VIRGINIA: wet swampy depression in pineland 3 to 4 miles northwest of Waverly, June 7, 1946, *Fernald & Moore*, no. 15,102 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.), *Fernald, Long & Clement*, September 9, 1946, no. 15,266 and Sept. 11, no. 15267; peaty swales and open bushy or wooded swamp 3½ to 4 miles northwest of Homeville, September 11, 1946, *Fernald, Long & Clement*, no. 15,267.

Rubus flagellaris Willd. of dry open habitats has the usually hooked prickles 2–4 mm. long, the leaves glabrous or essentially so, except for occasional sparse pubescence on the midrib beneath; the pedicels glabrous, 4–12 cm. long and elevating the flowers and fruits well above the bracteal leaves. *R. hypolasius* of swampy pineland and wet thicket has longer and straighter prickles on the primocanes; the lower surfaces of both primocane- and floricane-leaves soft to the touch with pilosity; the short pedicels pilose and not standing evidently above the leafy bracts. Found

by us in similar swampy habitats several miles apart, it evidently has a good area of development.

In its relatively short pedicels *Rubus hypolasius* somewhat suggests *R. celer* Bailey, Gent. Herb. v. 281, fig. 117 (1943), but that species is more slender, with very short and hooked prickles, glabrous foliage and much narrower primocane-leaflets. I can place it with none of the species of § *Flagellares* described and beautifully illustrated by Bailey. See p. 92.

*R. (§ Tholiformes) **subinnoxius,** sp. nov. (tab. 1067–1069), valde arcuans cannis tholos 2 m. altos formantibus, cannis vel ramis pendulis ad 2 m. longis apicibus prostratis plus minusve radicantibus; primocannis simplicibus vel deinde ramosis, arcuatis angulato-subteretibus glabris inermibus vel remote aculeatis; aculeis oblique deltoideo-subulatis unguiculatis 2–5 mm. longis basi 2–4 mm. lato; primocannae foliis imis ternatis mediis superioribusque quinatis submembranaceis supra strigoso-villosis subtus molliter piloso-tomentulosis; petiolo inarmato vel remote unguiculato-armato; foliolis ovatis vel ellipticis duplicato-serratis, foliolo terminali 8–9 cm. longo 4.5–6 cm. lato abrupte longeque acuminato basi cordato, petiolulo tomentoso 2.5–3 cm. longo, foliolis mediis ellipticis vel elliptico-oblongis acuminatis subsessilibus basi sensim rotundatis; floricannis intricate ramosis ramis arcuato-pendulis; floricannae foliis ternatis, foliolis anguste ellipticis vel anguste cuneato-obovatis acutis vel acuminatis dentato-serratis supra strigosis subtus piloso-tomentosis, foliolo terminali 2–5 cm. longo; inflorescentiis perbrevibus corymbiformibus foliosis, 1–4-floris, bracteis trifoliolatis quam pedicellis longioribus; pedicellis dense pilosis plerumque inarmatis 0.5–2 cm. longis; calycis pilosis inarmatis segmentis deinde reflexis; fructibus ad 1.5 cm. diametro.—Southampton County, Virginia: thicket bordering Whitefield Millpond, southwest of Corinth, June 5, 1946, *Fernald & Moore*, no. 15,103 (type in Herb. Gray.; isotype in Herb. Phil. Acad.).

In its very prolonged and eventually tip-rooting branchlets, its few-flowered corymbs and the very small leafy bracts *Rubus subinnoxius* at once suggests *R. Akermani* Fernald in Rhodora, xlvii. 152, plates 890 and 891 (1945). That characteristic doming shrub of Brunswick and Greensville Counties, Virginia, however, has the fertile branches and branchlets much more stiffly spreading, the very firm primocane-leaves all 3-foliolate and with much shorter pubescence on the upper surface, the bracteal leaves very firm and stiff, with mostly obtuse leaflets. *R. subinnoxius*, with long and flexuous recurving primocane-branches and -branchlets,

has membranaceous leaves, those of the primocanes mostly 5-foliolate and with remarkably long appressed villi on the upper surface, those of the floricanes (especially the bracteal ones) acute to acuminate. See p. 92.

*R. (§ CUNEIFOLII) **uliginosus,** sp. nov. (TAB. 1070 et 1071), a *R. Humei* differt primocannae aculeis 5–9 mm. longis; primocannae foliis foliolis mediis subsessilibus vel breviter petiolulatis. —Norfolk County, VIRGINIA: damp old clearing, eastern side of Great Dismal Swamp, north of Wallaceton, June 10, 1946, *Fernald & Moore*, no. 15,101 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

Rubus uliginosus is the only member of § *Cuneifolii* known in Virginia with terminal leaflet of the primocane-leaves elliptic. The others have this leaflet broadened toward the summit (obovate) or toward the base (ovate). It is unusual in growing in decidedly swampy ground, the others rarely, if ever, getting their bases immersed. It is very close to *R. Humei* Bailey, Gent. Herb. v. 457, fig. 208 (1943), the outline of the leaflet seeming identical; but in *R. Humei* the upper or intermediate paired leaflets are on long petiolules, in *R. uliginosus* nearly sessile. Furthermore, the prickles on the primocane of the latter are almost twice as long. *R. Humei* is "the biggest of the Cuneifolii, attaining a height of 10 feet"; *R. uliginosus* is content to stop at 2 or 3 feet. Bailey speaks of *R. Humei* as "the only paludose species" of the section. Certainly the commonly inundated low areas of the Great Dismal Swamp, where *R. uliginosus* grows, are "paludose" enough! See p. 95.

*R. SUUS Bailey. Range extended from the mountains of North Carolina to the Coastal Plain of Virginia. ISLE OF WIGHT COUNTY: dry sandy woods near Pope Swamp, northeast of Zuni, *Fernald & Long*, no. 14,342, the specimens closely matching Bailey's description and illustration in Gent. Herb. v. 634, fig. 281 (1945).

*R. IMMANIS Ashe. Range extended from the mountains of North Carolina and Tennessee to the Coastal Plain of Virginia. SUSSEX COUNTY: disturbed soil, bottomland woods along Nottoway River west of Homeville, *Fernald & Long*, no. 14,343—plants high-arching, 10 ft. high, with superior fruit. A close match for the description and figure in Bailey, Gent. Herb. v. 683, fig. 307 (1945).

*R. (§ ARGUTI) **cupressorum,** sp. nov. (TAB. 1072–1074), a *R. vixarguto* differt primocannae foliis foliolis abrupte longeque

acuminatis, supra strigoso-villosis subtus minute pilosis venis villoso-strigosis; floricannae foliis supra glabris subtus ad venas strigoso-villosis; pedicellis minute pilosis inarmatis.—Cypress swamps of southeastern VIRGINIA: wooded river-swamp along Northwest River, northeast of Wallaceton, Norfolk County, June 10, 1946, *Fernald & Moore*, no. 15,100 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); cypress-swamp on Flag Run, southwest of Story, Southampton County, September 15, 1946, *Fernald, Long & Clement*, no. 15,263; siliceous and argillaceous alluvium bordering cypress-swamp, Nottoway River above Cypress Bridge, *Fernald, Long & Clement*, no. 15,268.

At the type-station, margin of cypress-swamp along Northwest River, *Rubus cupressorum* forms a very tangled thicket 2 m. high, the branches of the floricanes intricately forking and widely arching but with no tendency to tip-rooting. The primocanes also incline to branch. At the other two stations, cypress-swamps about 50 miles farther inland, the fruiting period was long past but the primocanes were much branched. On first inspection *R. cupressorum* might be mistaken for *R. vixargutus* Bailey, Gent. Herb. v. 622, fig. 275 (1945) but the leaflets of the primocanes are abruptly long-acuminate instead of gradually subacuminate; their upper surfaces are strigose-villous instead of "glabrous on upper face". The leafy bracts of the racemes in *R. vixargutus* are described by Bailey as having "strongly obovate or oblanceolate shapes in floral leaflets some of which may be obtuse"; and he describes in Latin the "pedicelli inermes", in English "unarmed pedicels". The upper (flowering) branchlet in his illustration meets these requirements but the lower fruiting branchlet is shown with the leaflets ovate, long-acuminate and jagged-toothed, the pedicels all strongly armed with prickles! The author and the artist, whose drawings seem remarkably accurate, appear not wholly to agree. I am not so situated as to decide what are the real characters. The striking difference in the primocane-foliage and the occurrence of this shrub in cypress-swamps of the Coastal Plain indicates that *R. cupressorum* is not *R. vixargutus* of wooded areas on Lookout Mountain, Tennessee. See p. 95.

Rubus cupressorum might by some be pushed into *R. jugosus* Bailey, l. c. 629, fig. 278 (1945) of the mountains of southwestern Virginia, but that species has the primocane-leaflets more oblong, with nearly parallel straight margins and densely pubescent beneath and the inflorescence more cymiform.

CASSIA NICTITANS L., var. HEBECARPA Fernald. To the type-station in Northampton County add one in PRINCESS ANNE COUNTY: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,271. See p. 101.

*CROTALARIA PURSHII DC., var. **bracteolifera,** var. nov. (TAB. 1075, FIG. 2 et 3), caule ramosissimo; foliis linearibus vel anguste lineari-lanceolatis; pedunculis longioribus 7–14-bracteoliferis.—VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, Nansemond County, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,273 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). NORTH CAROLINA: savanna 5 miles east of Fayetteville, Cumberland County, June 11, 1938, *Godfrey*, no. 4552; savanna at Chocowinty, Beaufort County, July 20, 1938, *Godfrey*, no. 4505. SOUTH CAROLINA: grass-sedge bog or savanna, 7 miles east of Andrews, Georgetown County, June 27, 1939, *Godfrey & Tryon*, no. 148; mucky open thicket, 2 miles north of Lake City, Florence County, July 9, 1927, *Wiegand & Manning*, no. 1500. GEORGIA: dry sandy pine-barrens, ½ mile northeast of Townsend, McIntosh County, July 23, 1927, *Wiegand & Manning*, no. 1504.

Typical *Crotalaria Purshii*, based on *C. laevigata* Pursh, not Lamarck, of "pine-woods of Virginia and Carolina", was described "simplex foliis lanceolato-oblongis, . . . racemis oppositifoliis subtrifloris". That was a good characterization of the typical plant of dry sandy pineland or oak-barrens in southeastern Virginia and Carolina (portions shown in our fig. 1), with mostly simple stems, the lower and median leaves lance-oblong and 6–15 mm. wide, the upper ones narrower, the longer peduncles with 2–6 flowers or bracts borne from near or well above the middle to the tip. Var. *bracteolifera*, chiefly of bogs and savannas, has the branches freely once or twice forking, making somewhat intricate bushy-looking plants, the leaves linear or narrowly linear-lanceolate, the broader ones 2–7 mm. wide but the great majority up to only 2–5 mm. Its longer peduncles bear 7–14 flowers or bracts, though the shorter ones have fewer bracts, and the bracts extend well down the axis, often nearly to its base. The branching habit, narrow leaves and numerous bracts mark an extreme of the species which is conspicuously unlike typical *C. Purshii*, but several collections, especially from Florida and the Carolinas, seem quite transitional. I can, therefore, not treat the plant of bog or savanna as a species. See p. 99.

C. spectabilis Roth. Southampton County: very tall and handsome along a roadside fencerow west of Franklin, *Fernald, Long & Clement*, no. 15,272.

Stylosanthes riparia Kearney. On the beaten gravelly foot-path along the Norfolk and Western Railway, west of Kilby, this usually small but often depressed species, responding apparently to the constant trampling through many years, has put out new vigorous sprouts until it now forms intricate and highly floriferous carpets toward a meter across! S. biflora (L.) BSP., var. hispidissima (Michx.) Pollard & Ball, similarly trampled on, has there made broad but less extensive mats. Small bits from such giant individuals more than fill herbarium-sheets. Such plants in full bloom are wonderfully attractive and suggest possibilities for rock-gardeners.

*Vicia sativa L., var. linearis Lange. Norfolk County: fallow field near Yadkin, *Fernald, Long & Abbe*, no. 14,183.

The extreme with leaflets of all but the basal leaves linear and emarginate or apiculate. Not much collected in America.

Pueraria Thunbergiana (Sieb. & Zucc.) Benth. A few years ago we looked upon the Kudzu-vine as a beautiful strong-growing climber with deliciously fragrant deep purple flowers and a rarity in the wild in the latitude of Virginia. Now it is becoming one of the commonest high-climbers along roadsides and borders of woods. At the rate it is increasing and enmeshing shrubs and trees up to 40 ft. high it may soon be a competitor of Japanese Honeysuckle.

Euphorbia humistrata Engelm. To the two stations recorded in Henrico County add one in similar habitat in Nansemond County: dry sandy and gravelly railroad embankment west of Kilby, *Fernald, Long & Clement*, no. 15,299.

*Vitis vinifera L. Henrico County: waste places and railroad-ballast, near Chesapeake and Ohio Railroad, Richmond, *Fernald & Long*, no. 12,404.

Obviously derived from seeds of "Tokay," "Malaga" or other such grapes thrown from car-windows; now forming dense thickets.

*V. araneosa Le Conte (*V. rufotomentosa* Small). Surry County: dry woods north of Surry Courthouse, *Fernald & Long*, no. 13,076.

Quite like the type of *Vitis araneosa* Le Conte (1853), preserved

Photo B. G. Schubert

RUBUS HYPOLASIUS, all figs. from TYPE: FIG. 1, fruiting branchlets, × 1; FIG. 2, lower surface of floricane-leaf, × 10; FIG. 3, fruiting pedicel and calyx, × 5.

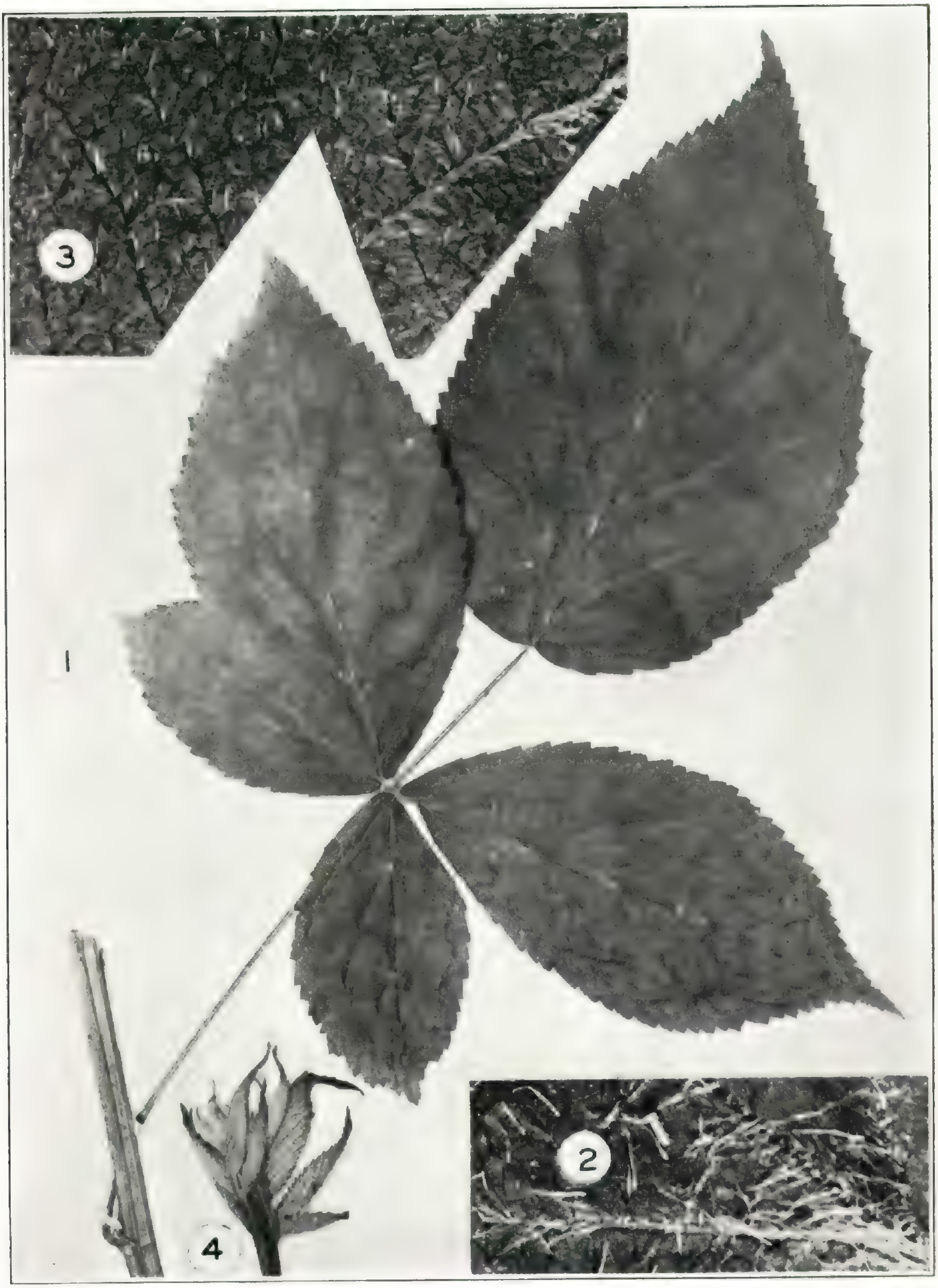

Photo B. G. Schubert

Rubus subinnoxius, all figs. from type: fig. 1, portion of primocane and a primocane-leaf, × 1; fig. 2, upper and fig. 3, lower leaf-surface, × 10; fig. 4, unexpanded young leaves, × 1.

at the Academy of Natural Sciences of Philadelphia and studied by me in 1939—See Fernald in Rhodora, xli. 434 (1939). Closely matched also by an isotype of *V. rufotomentosa* Small, which is quite like the Le Conte type. Although Le Conte's material was from Athens, Georgia, and Small says "Florida to Louisiana" and Bailey, Gent. Herb. iii. 292 (1934) knew it "positively only from northern and peninsular Florida", the Le Conte type from Athens, Georgia, and Small's type from Lake County, Florida, are closely matched in the Gray Herbarium by material from Augusta, Georgia, *S. T. Olney and J. Metcalf*, nos. 213 and 214, identified by Bailey as *V. aestivalis;* and by an old specimen from South Carolina from *M. A. Curtis*. Even so, Surry County, Virginia, is a good extension northward. Whether it is a true species must yet be determined.

Does Gordonia grow in Virginia?—One of the handsomest evergreen trees or shrubs of our southern Coastal Plain is the Loblolly Bay or Tan Bay, *Gordonia Lasianthus* (L.) Ellis.[1] An evergreen with large white flowers on long peduncles, it shares the beauty and distinction of *Stewartia* and other members of the *Theaceae;* and for more than a century and a quarter it has been credited with extending northward into Virginia. Constant watching for it in recent years has failed to reveal it. Kearney, in his very adequate Report on a Botanical Survey of the Great Dismal Swamp Region (Contrib. U. S. Nat. Herb. v. no. 6 (1901)), covering the area from the northern side of Albemarle Sound, in northeastern North Carolina, to the southern side of Chesapeake Bay, did not record it, although he did not see its handsomer cousin, *Stewartia Malachodendron*, which has subsequently been found in the Great Dismal Swamp as well as farther east in his area. Of course, the failure of Kearney and of his successors in exploring the region to locate any *Gordonia* is negative evidence but it is significant that, so far as I can learn,

[1] Although the binomial *Gordonia Lasianthus* is accredited to Linnaeus ("Linn. Mant. ii. 570") in Index Kewensis, while the genus is properly ascribed to "Ellis, in Phil. Trans. lx. (1770) 518, t. 11", it certainly was Ellis's binomial. After his very full account of the characters of the genus Ellis gave a very detailed plate of "Gordonia Lasianthus. *Vulgo* Loblolly Bay" and the explanation of his plate is of "*Gordonia Lasianthus*". In Mantissa Altera in 1771 Linnaeus had *Gordonia* without a word of description or a reference to John Ellis, the Linnaean *Gordonia* thus being a mere nomen. The binomial *G. Lasianthus*, resting on *Hypericum Lasianthus* L. (1753), had a proper basis under an undefined generic name, but Ellis's earlier and identical binomial has right-of-way.

there is no material in any of our representative herbaria from a Virginian station.[1]

Gordonia Lasianthus was first described and illustrated by Plukenet in his Amaltheum Botanicum, 7, t. 352, fig. 3 (1697) as "Alcea *Floridana* quinquecapsularis, Laurinis foliis, leviter crenatis . . . **Rosebay**". In 1731 Catesby, Nat. Hist. Carol. Fla. i. 44, t. 44, had a beautiful plate of it under Plukenet's descriptive phrase as "Loblolly Tree"[2], stating that "it grows in *Carolina;* but not in any of the more Northern Colonies." In his Travels through North & South Carolina, Georgia, East and West Florida (1791) John Bartram went into ecstasies (pp. 161, 162) over "The tall aspiring Gordonia lasianthus . . . in all its splendour, is every way deserving of our admiration . . . it is sixty, eighty or an hundred feet high"; but that was not in Virginia! Dr. Francis Harper, in his masterly study of Bartram's Diary of a Journey through the Carolinas, Georgia and Florida from July 1, 1765 to April 10, 1766,[3] repeatedly refers to Bartram's records of *Gordonia* as "Red Bay": "Alcea (or 'Alcea florideana' or 'Alcea floridana') . . . red bay or loblolly bay (*Gordonia lasianthus*)", *Harper*, p. 79; "probably red bay (*Gordonia lasianthus*)", p. 81; "Bay, red: in this case probably red or loblolly bay (*Gordonia lasianthus*)—not *Persea borbonia*", p. 82, etc. In other words, the name Red Bay was used interchangeably for *Gordonia* and for *Persea.*

Linnaeus, Sp. Pl. ii. 783 (1753), citing the Plukenet account and that of Catesby, already referred to (as well as a reference to Amman and his own Hort. Cliff.), placed the species in *Hypericum.* Then John Ellis, taking up the pre-Linnaean *Gordonia,* redefined it as *Gordonia,* but neither of them indicated it from north of Carolina.

[1] When, in Claytonia, ii, 36 and 37 (1936), I enumerated 29 species which had been standing as Virginian without wholly clear title, I had written "it would be reassuring to see authentic material of *Gordonia Lasianthus* from indigenous Virginian trees". Unfortunately, however, the mimeographed issue of the journal, of which I saw no proof, stated that "it was reassuring" etc. I wish that such wishful thinking were true!

[2] "Loblolly, a loutish or foolish person, nautically loblolly-boy or surgeon's assistant, is a nautical name . . . It was early used in the West Indies as a plant name, and appears in Plukenet's *Almagestum Botanicum* . . . in 1696, where this phrase occurs on page 38: 'Arbor Indica baccifera Verbasci foliis lanuginosa, Loblolly Barbadensibus dicta'. Plukenet's plant is *Cordia macrophylla*, Mill., which thus appears to be the first tree to which the name Loblolly was applied in print".—Sargent, Silva, i. 42 (1890).

[3] Trans. Am. Phil. Soc. n. s. xxxiii. pts. i (1942) and ii (1943).

It is also significant that Michaux, who travelled and collected in southeastern Virginia and who had an eye particularly for trees, did not see *Gordonia* there, he giving in his Fl. Bor.-Am. ii. 43 (1803) the "*Hab.* in maritimis Carolinae et Floridae", while his son, F. A. Michaux (Hist. Arb. Forest. Am. Sept.) could not bring it up to Virginia. The first and apparently the basic record for Virginia seems to be that of Pursh, Fl. Am. Sept. ii. 451 (1814), Pursh stating its range as "In cedar-swamps, near the sea-coast: Virginia to Florida". All subsequent students of our flora have accepted Pursh's record as authentic; but where in Virginia is that tree up to 100 feet high, the "splendour" of which in "every way deserves of our admiration"? If it is there, surely someone should have seen it.

Frederick Pursh, at the very opening of the 19th century, collected in southeastern Virginia, making his headquarters, apparently, in Southampton County, somewhere near Sebrell, at least north of Jerusalem (now Courtland). In the portion of his herbarium preserved at the Academy of Natural Sciences of Philadelphia there is nothing from the Great Dismal Swamp, evidence that Pursh did not penetrate that vast and rather formidable area, the one extensive tract in which "cedar-swamps" have occurred in Virginia. There the southern Cedar, *Chamaecyparis* (locally known as "Juniper") once prevailed and even in his report in 1901 Kearney was able to state that it was "Abundant in parts of the Dismal Swamp . . . Locally known as 'juniper'". Today it is mostly small remnants or very young colonies. *Persea*, "Popularly confused with *Magnolia virginiana*, under the name of 'bay'" (Kearney, p. 526), is more commonly called "Red Bay" and is found pretty generally there, at the western side of Lake Drummond forming a pure forest within a short distance of a juvenile "cedar-swamp". In view of the abundance of *Persea* (Red Bay) in this greatest of all Virginian "cedar-swamps" and in view of the early name "Red Bay" also for *Gordonia*, it seems not unreasonable to surmise that Pursh's record of *Gordonia* from "cedar-swamps . . . Virginia" may have started from reports of Red Bay in this extensive area where cedar-swamps once prevailed.

Pursh, who was a notorious dipsomaniac, made many records which cannot be substantiated, like his *Dryas tenella* "On the

white hills of New Hampshire", the specimen "*in Herb. Banks*", being really from Newfoundland. Or again, Pursh, who had been on the lower St. Lawrence, where it abounds on brackish shores, gave a good description, as *Swertia pusilla*, of the little annual now known as *Lomatogonium rotatum* (L.) Fries, said by Pursh to grow "On alpine regions of the White-hills of New Hampshire . . . June . . . In the Banksian Museum are specimens from Labrador, in every respect agreeing with the New Hampshire plant". The plant in the Banksian Herbarium is characteristic *Lomatogonium rotatum* (*Pleurogyne rotata*), which follows subsaline or brackish shores up the St. Lawrence to regions known to Pursh, and down the coast, locally, to eastern Maine. An army of keen enthusiasts has sought vainly for it in the nonsaline White Mountains in "June". On the brackish shores of the lower St. Lawrence it flowers from July to September. At the nearest known station to the White Mts., "brackish shores" at Schoodic Point, Hancock County, Maine (*Stebbins*, no. 451), it was beginning to flower on August 28, 1908. It is feared that in this case, as well as that of the Dryas (and some others) Pursh worked on his specimens while "under the influence". At any rate, until someone brings forward real evidence of *Gordonia* being in Virginia I am content to think that Pursh made another mistake.

Hypericum setosum L. To the relatively few recorded stations add another in Nansemond County: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,308. See p. 99.

H. boreale (Britton) Bicknell. To the stations in the mountains of western Virginia add one on the coast, in Princess Anne County: wet peaty border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,304. See p. 100.

*Hypericum canadense L., var. **galiiforme,** var. nov. (tab. 1076), caule pergracile reclinato vel adscendento 0.8–3 dm. longo simplice vel sparse ramoso; foliis anguste obovatis vel oblanceolatis petiolatis; laminis primariis 5–15 mm. longis 2–4 mm. latis; inflorescentia laxe brachiata; sepalis 1.5–2 mm. longis; capsula ovoidea apice rotundata 3–3.5 mm. longa.—Sussex County, Virginia: sandy and peaty shore of Airfield Millpond, southwest of Wakefield, September 11 and 12, 1945, *Fernald & Long*, nos. 14,962 (type in Herb. Gray.; isotype in Herb. Phil. Acad.) and 14,964; sphagnous wooded swamp southwest of

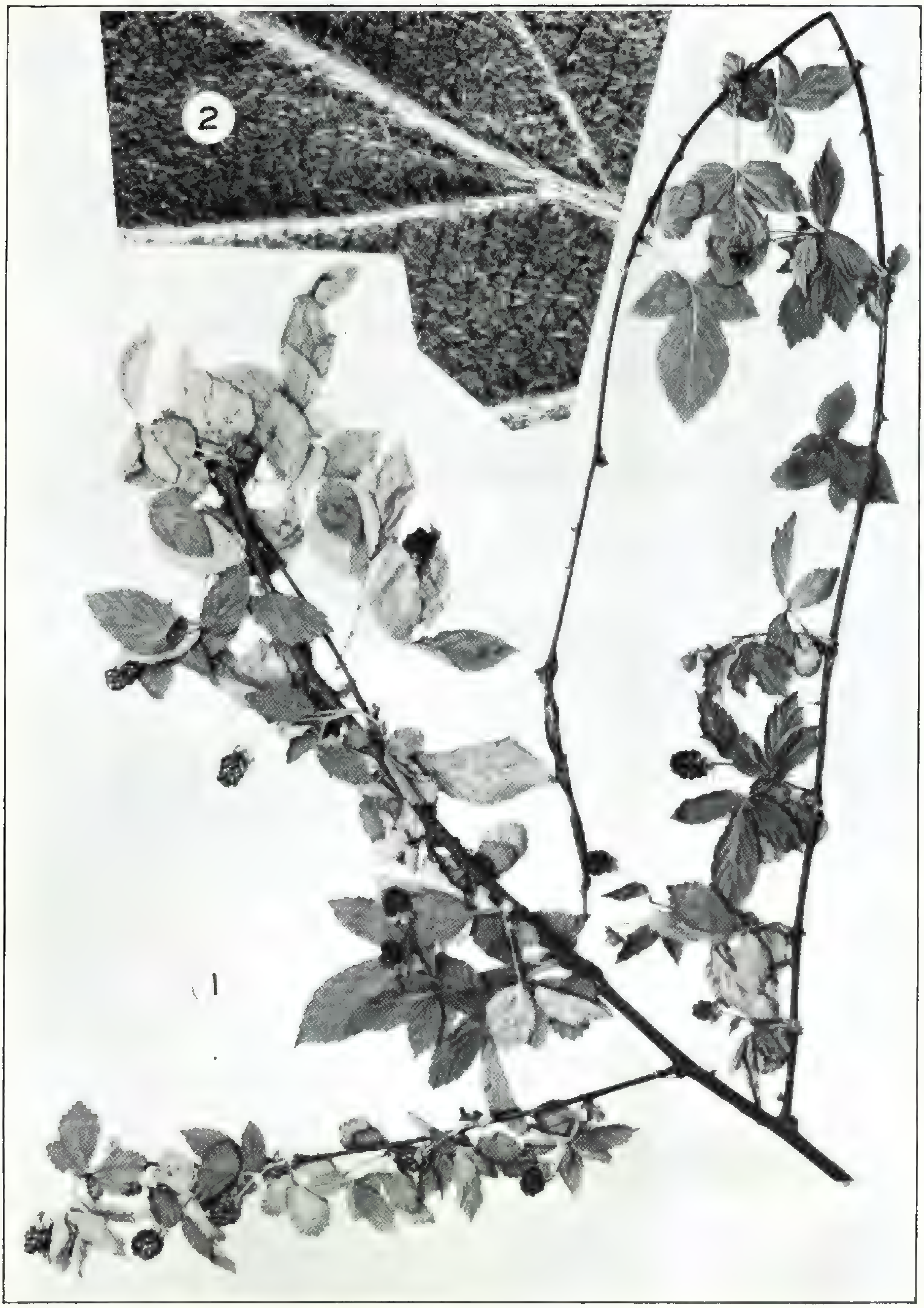

Photo B. G. Schubert

RUBUS SUBINNOXIUS, both figs. from TYPE: FIG. 1, portion of floricane, × ⅓; FIG. 2, lower surface of primocane-leaf, × 10.

Photo B. G. Schubert

RUBUS SUBINNOXIUS, all figs. from TYPE: FIG. 1, small fruiting branchlet, × 1; FIG. 2, fruiting pedicel and fruit, × 5; FIG. 3, upper surface of floricane-leaf, × 10.

Photo B. G. Schubert

Rubus uliginosus, both figs. from type: fig. 1, portion of primocane, × 1; fig. 2, lower surface of primocane-leaf, × 10.

Photo B. G. Schubert

RUBUS ULIGINOSUS, both figs. from TYPE: FIG. 1, fruiting cane, × 1; FIG. 2, upper surface of floricane-leaf, × 10.

Photo B. G. Schubert

Rubus cupressorum, all figs. from type: fig. 1, portion of primocane, × 1; fig. 2, upper, and fig. 3, lower surface of primocane-leaf, × 10.

Photo B. G. Schubert

RUBUS CUPRESSORUM, all figs. from TYPE: FIG. 1, fruiting branchlets, × 1/3; FIG. 2, upper, and FIG. 3, lower surface of floricane-leaf, × 10.

Photo B. G. Schubert

Rubus cupressorum, both figs. from type: fig. 1, pedicel and fruiting calyx, × 5; fig. 2, fruiting branchlets, × 1.

Photo B. G. Schubert

CROTALARIA PURSHII: FIG. 1, summit (in two parts) of plant, × 1. Var. BRACTEOLIFERA: FIGS. 2 and 3, portions from summit of TYPE, × 1.

Brittle's Millpond, west of Wakefield, September 11, 1945, *Fernald & Long*, no. 15,954.

Hypericum canadense, var. *galiiforme*, especially when reclining and weakly branching among the natural covers of sphagnous pockets, so strikingly suggests a weak *Galium* of the *G. trifidum* series as to be deceptive; in more open spots (our no. 14,964) it is as strongly ascending as typical *H. canadense*. In the latter wide-ranging and highly variable plant the median and upper cauline leaves are linear to linear-oblanceolate, sessile or nearly so; the sepals 2.5–4.5 mm. long; the finally conic to lanceolate and acuminate-tapering capsules 4–6.5 mm. long. Var. *galiiforme* is weak, reclining when in deep *Sphagnum*, its very short and broad leaves varying from narrowly obovate to oblanceolate, petioled, and only 5–15 mm. long. The very lax and open cyme bears flowers and fruits smaller than in typical *H. canadense:* sepals only 1.5–2 (instead of 2.5–4.5) mm. long and roundish-tipped capsule only 3–3.5 (instead of 4–6.5) mm. long. The most dwarf extremes of *H. canadense* (from Newfoundland and the Labrador Peninsula) have fruits and foliage nearly as short as in var. *galiiforme* but their leaves are those of true *H. canadense*.

At Airfield Millpond var. *galiiforme* forms definite carpets in the *Sphagnum* and wet peat quite apart from the gigantic typical *H. canadense*, also found there and from the heteromorphic and always puzzling half-sterile *H. dissimulatum* Bicknell, which there reaches a height of 7.5 dm. See p. 87.

LECHEA MARITIMA Leggett, var. VIRGINICA Hodgdon. To the few recorded stations, in Northampton, Elizabeth City and Princess Anne Counties, add another in PRINCESS ANNE COUNTY: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,301. See p. 101.

RHEXIA CILIOSA Michx. Range extended farther east in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,311. See p. 98.

*LUDWIGIA VIRGATA Michx. Range extended northward into southeastern Virginia. NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,315.

Found on September 8th, presumably two to three months after flowering, only a single much depleted fruit being left. The foliage and basal habit are those of *L. virgata*. See p. 99.

L. alata Ell. To the recorded stations in Princess Anne add one in Norfolk County: fresh tidal reed-marsh along Northwest River below Northwest, *Fernald & Long*, no. 14,965. See p. 90.

L. pilosa Walt. To the single station each, recorded in Norfolk and Nansemond, add from Nansemond County: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,316; wet hollow in old woodroad about 1 mile east of Buckroe (Purvis R. R. station), *F. L. & C.*, nos. 15,317 and 15,318; border of swampy pineland south of Buckroe, *F. L. & C.*, no. 15,319.

Most characteristic plants, like no. 15,319, are tall (up to 1.2 m. high or long), soon freely and divergently branched, either ascending or becoming topheavy and arching to the ground and rooting at tip, the leaves of the fertile stems and branches soft-pilose. Late in the season the prostrate overwintering basal shoots develop, these having short and broad glabrous or nearly glabrous leaves purple beneath. At the station for nos. 15,317 and 15,318, east of Buckroe, small and simple juvenile plants without branches and with nearly or quite glabrous broad leaves purple beneath were fruiting, precocious individuals not waiting for the next year! See p. 99.

L. brevipes (Long) Eames. To the few recorded stations (in Princess Anne, Isle of Wight and Norfolk) add two others. Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,324. Southampton County: wet peaty margin of Whitefield's Millpond, southwest of Corinth, *Fernald & Moore*, no. 15,119, *Fernald, Long & Clement*, no. 15,323.

At Whitefield Pond, the most inland station known, it was possible to extract continuous fruiting strands up to 7.5 dm. long. See pp. 92 and 100.

Sanicula Smallii Bicknell. Local range extending eastward into Nansemond County: rich sandy and loamy oak and hickory woods just east of Suffolk, *Fernald, Long & Clement*, no. 15,327. See p. 96.

The Virginian Record of Oxypolis filiformis.—For nearly a century *Oxypolis filiformis* (Walt.) Britton, either under that name or one of its synonyms, *Tiedemannia teretifolia* (Muhl.) DC., has been credited with growing in Virginia, and this record had apparent validation by Coulter & Rose, in their *Notes on*

Umbelliferae of E. United States. III, Bot. Gaz. xii. 74 (1887) where it was stated by the monographers of the family to grow from "Virginia to Florida and Louisiana", although later, when it "came to a show-down" in their Monograph of the North American Umbelliferae, Contrib. U. S. Nat. Herb. vii. no. 1: 193 (1900), though still holding to "Ponds and swamps from southern Virginia to Florida and west to Louisiana", they could cite as "*Specimens examined*" only material from Florida and Mississippi, except for their very local var. *Canbyi* of Ellendale, Delaware (*O. Canbyi* (C. & R.) Fernald). Actually, *O. filiformis* is represented in the Gray Herbarium as extending westward into Texas and northward along the Coastal Plain into southeastern North Carolina. There are in this herbarium alone six numbers from North Carolina, but the northernmost material is from Onslow County (shallow water, stagnant pool, Dixon, *L. F. & Fannie R. Randolph*, no. 972), fully 125 miles south of the Coastal Plain of Virginia. Mr. Long and I, anxious to collect a species seemingly well attested as growing in southern Virginia, have wallowed through innumerable inundated pond-margins for a plant which the Randolphs would probably have seen if it had been there. Finally, deciding to follow up the record, I have found that it started in Gray, Man. ed. 2: 153 (1856), without specific description, "Virginia (Harper's Ferry) and southward". Harper's Ferry, then in Virginia, is not well defined by Coulter & Rose's "southern Virginia". Furthermore, the plant of Harper's Ferry, "collected by Doctor Aiken some seventy-five years before [before 1911], near Harper's Ferry, W. Va." (Rose in Contrib. U. S. Nat. Herb., xiii. 289 (1911)), extends farther down the Potomac into Maryland and Virginia and is the remarkable little aquatic described as *Harperella* (not named for Harper's Ferry) *vivipara* Rose, l. c. 290 (1911), and subsequently transferred to *Ptilimnium* as *P. viviparum* (Rose) Mathias in Brittonia, ii. 244 (1936).[1] Obviously, if *Oxypolis filiformis* is now detected about ponds or savannas of southeastern Virginia it will be new to the flora of the state. One may also, with some hope, watch

[1] "Southern Virginia" of the treatment in the North American Fl. xxviii B, 200 (1945), one of its authors being the author of *Ptilimnium viviparum* of *northern* Virginia, should obviously be dropped. The range of *Oxypolis ternata* on the same page (in 1945) could have been extended into the baffling "southern Virginia" on the basis of collections reported in Rhodora, xli. 552, with map 8 on p. 471 (1939).

there for *O. Canbyi* (Coult. & Rose) Fernald in Rhodora, xii. 139 (1939) for, although perhaps extinct at its original station in Delaware, there is beautiful material of it in the Ravenel herbarium at Converse College from Lee County, Georgia. Georgia material is also cited by Mathias & Constance in the North American Flora.

Virginian Occurrence of Kalmia hirsuta doubted.—*Kalmia hirsuta* Walt., so distinct that Small considered it a monotypic genus, was described from South Carolina. Michaux knew it only from Georgia and even Pursh was content with "South Carolina and Georgia". M. A. Curtis did not know it from North Carolina; at least he did not mention it in his various enumerations of plants of that state. In the Gray Herbarium, there is no material of it from north of the Coastal Plain of South Carolina. Just how it wandered into Gray, Man. ed. 2: 256 (1856) I can not determine, but it is there entered: "Sandy pine-barren swamps, E. Virginia and southward". Virginia has subsequently stood in practically all manuals as having *K. hirsuta*. Until real evidence of it in the state is forthcoming it should be dropped. See p. 86.

*Lyonia ligustrina (L.) DC., forma **nanella,** f. nov. (tab. 1077). Frutex 1.5–2 dm. altus, foliis maturis 1–3 cm. longis 0.5–1.4 cm. latis; capsulis 2–3 mm. diametro.—Nansemond County, Virginia: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,331.

Forma *nanella* is the tiniest extreme of *Lyonia ligustrina*. Whether it is a dwarf form of typical *L. ligustrina* or of var. *salicifolia* (Wats.) DC. is at present questionable. One individual has the leafy inflorescence of the latter. The others have leafless inflorescences, but the plants are so mature that the leafy bracts may have disappeared. Further material, secured earlier in the summer, will settle that point. See p. 100.

Symplocos tinctoria (L.) L'Hér., var. pygmaea Fernald. Add another station in Isle of Wight County: sandy pine-barrens south of Zuni, *Fernald & Moore*, no. 15,137.

Fraxinus americana L. Local range extended eastward to the Blackwater River. Nansemond County: sandy woods, bank of Blackwater River, George's Bend, south of South Quay, *Fernald, Long & Clement*, no. 15,338.

Photo I. D. Clement

Hypericum canadense, var. galiiforme, both figs. from type: fig. 1, three plants, × 1; fig. 2, fruits, × 10.

Photo B. G. Schubert

LYONIA LIGUSTRINA, forma NANELLA, all figs. from the TYPE: FIGS. 1 and 2, largest plant, × 1; FIG. 3, summit of small plant, × 1.

No. 15,338, with the glabrous branchlets and petioles of typical *Fraxinus americana*, grew beside a similar tree (not fruiting) with the branchlets, petioles and leaf-rachises tomentulose. This was obviously the relatively southern var. *biltmoreana*.[1]

F. PENNSYLVANICA Marsh., var. **subintegerrima** (Vahl), comb. nov. *F. juglandifolia*, β. *subintegerrima* Vahl. Enum. i. 50 (1804). *F. juglandifolia* Willd. Berl. Baumg. 117 (1796), not Lam. (1788). *F. caroliniana* Willd. l. c. 119 (1796), not Mill. (1768). *F. lanceolata* Borkhausen, Handb. Forst. Bot. i. 820 (1800). *F. caroliniana*, β. *F. latifolia* Willd. Sp. iv. 1103 (1806). *F. pubescens*, **subpubescens* Pers. Synop. ii. 605 (1807). *F. expansa* Willd. Berl. Baumg. ed. 2: 150 (1811). *F. viridis* Michx. Hist. Arb. Am. iii. 115, t. 10 (1813). *F. pubescens*, δ. *subpubescens* (Pers.) Pursh, Fl. Am. Sept. i. 9 (1814). *F. pennsylvanica*, var. *lanceolata* (Borkh.) Sargent, Silva, vi. 50 (1894).

The International Rules of Botanical Nomenclature demand the retention of the first validly published and legitimate name in each rank. The current *Fraxinus pennsylvanica*, var. *lanceolata* fails to satisfy this requirement.

*SABATIA DIFFORMIS (L.) Druce. SUSSEX COUNTY: sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, no. 14,977; *Fernald, Long & Clement*, no. 15,340.

First station known between North Carolina and eastern Maryland. Only a few plants noted in 1945, when the pond was abnormally high. In 1946, the pond being very low, the Sabatia was relatively abundant. See pp. 86 and 95.

(*To be continued*)

SHORTIA GALACIFOLIA IN ITS TYPE LOCALITY

ALTON E. PRINCE

Relatively little has been done toward making a definite survey of *Shortia galacifolia* Torrey and Gray in its type locality, and since the author had the opportunity to visit the area where this relatively rare plant was originally collected, it is perhaps worth while to record his findings. How unfortunate it is that Asa Gray did not realize when he made his search for this plant,

[1] FRAXINUS AMERICANA L., var. **biltmoreana** (Beadle) J. Wright in Gray Herb., July, 1941. *F. biltmoreana* Beadle in Bot. Gaz. xxv. 358 (1898).

between 1841 and 1879, that the "forks of the Keowee", given by Michaux in his journal as the locality where his collections were made in December 1788, is in South Carolina rather than in North Carolina. Jenkins[1] has given an excellent account of Shortia's history, therefore no more of it will be repeated here.

Soon after beginning my duties on the staff of the Botany Department at Clemson Agricultural College, Clemson, South Carolina in 1940, friends indicated that *Shortia* (Oconee Bells) could be found in the near-by Jocassee area. Being acquainted with the history of this plant through Professor Fernald's taxonomy course at Harvard, I became more than casually interested and subsequently planned several trips to the area, but inclement weather or other events interfered each time until the spring of 1944.

The first successful opportunity came following a day when Mr. J. A. Berly[2] told me that he was going into the Jocassee area and asked if I wanted to try to see the *Shortia*. Plant presses were prepared, because Dr. Lyman B. Smith had indicated in previous correspondence that this plant would be a good addition to *Plantae Exsiccatae Grayanae* IF it happened to be in sufficient quantity to permit such a collection. The next day (March 18, 1944) the author accompanied Mr. Berly and Mr. O. L. Cartwright[3] to Jocassee, South Carolina. Mr. Berly knew the region well and knew just where the *Shortia* was most easily reached. On arrival at the road that extends along the Whitewater River we noticed that a crew was at work widening the road and because Mr. Berly had indicated that the Oconee Bells were right along side of the road, my spirits dropped considerably. However, as we passed the vanguard of the crew with their bulldozer, Mr. Cartwright and I were told that some plants should be just ahead.

Why we, such neophyte botanists, should be given the privilege of seeing what Asa Gray searched for three times is difficult to understand, but it was certainly our good fortune, for *Shortia galacifolia* was blooming in all its rare and delicate beauty, its

[1] C. F. Jenkins, Arnoldia 2: 13–28. 1942.

[2] J. A. Berly, Assistant Entomologist, South Carolina State Crop Pest Commission, Clemson, South Carolina.

[3] O. L. Cartwright, Associate Entomologist, South Carolina Agricultural Experiment Station, Clemson, South Carolina.

bell-shaped, nodding flowers were there by the hundreds, one, two, three or more to a plant. They were not all white as described in the manuals, but many were delicate shades of pink and blue, adding in no small way to the spectacle. Many flower clusters were overhanging the shallow bank, brilliant against the shining green basal cluster of leaves. In addition there were several mats ten to twenty feet in size under the white pines, hemlocks and laurel. It was observed that some plants were connected by underground stolons, which were a means of spreading and, for the most part, accounted for the mats of closely associated plant groups. With the sounds of the road crew strong in our ears, few qualms were felt as we selected the plants for our collection. While Mr. Berly and I were putting the plants in press, Mr. Cartwright took pictures, two of which were included with the specimens distributed as *Plantae Exsiccatae Grayanae* Number 1378.

Additional trips on the two succeeding years were made into the area to look at the *Shortia* which was found in a few other more or less isolated places. On one trip it was observed that the road widening and subsequent lumbering operations almost eliminated the colonies from the spot where the exsiccatae specimens were collected. Another trip on May 21, 1946 to the exact fork of the Keowee which forms the Whitewater and Toxaway Rivers was more profitable. *Shortia* plants were found, not in abundance, but still plentiful, tucked away along the deep ravines cut by rivulets entering the Toxaway. It is hoped that in spots like these, *Shortia* will survive.

Department of Botany
University of Maine, Orono, Maine.

A NEW DYSSODIA FROM TEXAS

V. L. Cory

Among an excellent series of plant specimens coming to me in 1943 from a well-known young botanist, Dr. W. L. Tolstead, who then was with the U. S. Army in a training camp at the base of the Edwards Plateau some twenty miles southwest of Abilene in Taylor County, Texas, was one new to me, and which also

seemed to be undescribed. Dr. S. F. Blake has examined the material and reports that it seems to represent a valid species.

Dyssodia texana, new species. Plant a glabrous perennial, scarcely fruticose at base, up to 15 cm. tall and with a spread of 30 cm. or more: stems diffusely branched; leaves alternate, mostly less than 1.5 cm. long, pinnatifid with 6–12 filiform spinulose-tipped divisions, which are up to 1 cm. long; peduncles slender, 3–6.5 cm. long; involucre hemispheric, 5 mm. high and 7 mm. broad, glabrous, with up to 10 lanceolate accessory bracts; principal bracts in a single series wholly coalescent up to the triangular, short-acuminate free tips; glands 1 or mostly 2 on each bract; ligules 4 mm. long and 2 mm. broad; disk-corollas 3 mm. long, the tube as long as the throat; achenes 3 mm. long, sparingly hispidulous on the angles; squamellae 10, or sometimes reduced to no more than 5, and then of the same length and truncate, but usually of two general lengths, the longer 1 mm. long and the shorter 0.75 mm. long, oblong to somewhat obovate, from truncate to acute, all erose at summit, or occasionally one or two of the longer squamellae awn-tipped or shallowly 2-lobed at apex and bearing an awn from between the two lobes that is slightly longer than the squamella itself.

Dyssodia texana, sp. nov. Perennis glabra basi vix suffrutescens ad 15 cm. alta, ramosissima et 30 cm. vel ultra lata. Folia alterna pinnatifida 1.5 cm. longa, lobis filiformibus apice spinulosis ad 1 cm. longis. Pedunculi graciles 3–6.5 cm. longi. Involucra hemispherica 5 mm. alta 7 mm. lata glabra bracteolis ad 10 onusta. Phyllarii usque ad apices deltoideos breviacuminatos glandulose uni- vel bipunctatos liberos connati. Ligulae 4 mm. longae 2 mm. latae, corollae tubulosae 3 mm. longae tubo faucem aequante. Achaenia 3 mm. longa in angulis parce hispidula, squamellas 10 biformes (1 mm. et 0.75 mm. longas) rarius uniformes gerentia, quae variant oblongae vel subovatae, apice erosae vel longiores rarius aristatae vel bilobatae e sinu aristatae arista squamellam excedente.

Type specimen is *Tolstead* No. 7030. It was collected by Dr. W. L. Tolstead on April 26, 1943, at Camp Barkeley in Taylor County, Texas, where it was growing in grassland in a stony clay soil. It is deposited at the Gray Herbarium. Isotype specimens are deposited at other herbaria.

The relationship of this species seems to be with *D. Treculii* and *D. Hartwegii,* being more like the latter in the length of the achenes and pappus, and more like the former in the matter of foliage. Both these species have the pappus in two series, the inner of which is thrice the length of the outer and bearing an

awn from between the two lobes of the apex, while in this species, the squamellae, except for differences in length, which roughly are of longer ones as contrasted to shorter ones, are otherwise for the most part alike, usually none being awn-tipped or bearing an awn. Moreover, in this species the squamellae are much shorter than in the two others. This plant must be an endemic species, hence it is fitting to name it for the state in which it grows.

As yet I have not collected this plant myself; but another collection has come to me, and has been given my number 46098. This came from Mr. Horace Holiman of San Angelo, Texas, and was collected on his ranch eight miles east from that city. Mr. Holiman suspected this plant as one poisonous to sheep (which it probably is not, or more likely it is not eaten by sheep) and states that it grows even more abundantly a few miles east from his place. Sooner or later I hope to collect this species myself.

I wish to express deep appreciation to Dr. W. L. Tolstead for sending me this and many other plants of his excellent collection; to Mr. Horace Holiman for his excellent material; to Drs. S. F. Blake and I. M. Johnston for critical study of my material of this species; and to Dr. L. H. Shinners for valuable assistance in preparation of the Latin description.

Range Botanist, Texas Agricultural Experiment Station,
Sonora, Texas.

Petalostemum oreophilum a Species of Dalea.—My very good friend, Dr. B. C. Tharp, Professor of Botany at the University of Texas, recently told me of an observation made by himself and Dr. Fred A. Barkley, while they were studying a cotype specimen of *Petalostemum oreophilum* (a species described by me in Rhodora, Vol. 41, No. 492, December, 1939). Their discovery was that the flower of this species has ten stamens, whereas typical *Petalostemum* has but five. I have examined cotype material kindly loaned me by Mr. H. B. Parks, Botanist in Charge of the S. M. Tracy Herbarium, A. & M. College of Texas, and find from this that my friends are correct. At the time of finding this plant it resembled in appearance some of the species of *Petalostemum* and did not resemble any species of *Dalea* with which I was familiar. I took too much for granted,

and apparently did not observe the stamens closely and certainly did not count them. I regret not having been more careful. On the other hand, I am deeply grateful to Drs. Tharp and Barkley for giving me the opportunity to correct this unfortunate error by calling it to my attention, and permitting me to make here the proper combination—Dalea **oreophila** (Cory), new comb.

In Rydberg's treatment of the genus *Parosela* (for which the name *Dalea* is now conserved) in North American Flora, Vol. 24, Part 2, Jan. 22, 1920, this species belongs to the group of *Alopecuroides*. In this group it is more closely related to *D. leporina* (Ait.) Kearney & Peebles than it is to *D. alopecuroides* Willd. Except for the scarious margins, its bract is similar to that of *D. leporina*. From that species our plant differs in its lesser height (4 dm. or less vs. 5 dm. or more), in its fewer and shorter leaflets, in its shorter calyx (3 mm. vs. 4–5 mm.), in its corolla lacking any white in its coloration, and in its banner having a longer claw (3 mm. vs. 2 mm.).

In the original description I also failed to cite the type collection, hence do so now. It is my number 30392, and it is deposited at the Gray Herbarium.—V. L. Cory, Southern Methodist University, Dallas, Texas.

Flora of Delaware and the Eastern Shore.—All students of the flora of the Eastern States will heartily welcome the appearance of Mr. Robert Tatnall's *Flora of Delaware and the Eastern Shore*.[1] The introduction gives a clear and highly illuminating account of the physiography, phytogeography and history of botanical exploration (beginning with William Baldwin and Thomas Nuttall) of this fascinating peninsular-section of the northeastern Coastal Plain and adjacent Piedmont country, an area of somewhat more than 6000 square miles with a flora of about 2200 numbers. The plates are from beautiful photographs by Frank Morton Jones. The catalogue itself has been carefully prepared and is up-to-date, so carefully prepared that the rare slips (like citing E. B. Bartram, instead of Ascherson, as the author of *Bassia hirsuta*) are gratifyingly rare. Everyone will need this new *Flora*.—M. L. F.

[1] Tatnall, Robert R. *Flora of Delaware and the Eastern Shore*, an Annotated List of the Ferns and Flowering Plants of the Peninsula of Delaware, Maryland and Virginia. Pp. xxv + 313, map and 9 plates. $3.50. For sale at Academy of Natural Sciences, Philadelphia 3, Pa., or The Greenwood Bookshop, Inc., Wilmington 28, Del.

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LEMNA MINOR AS AN AGGRESSIVE WEED IN THE SUDBURY RIVER

Richard J. Eaton

For the past ten years a remarkable development of *Lemna minor* in the late summer and early autumn has become a conspicuous and rather disconcerting feature of the Sudbury River in eastern Massachusetts. During periods of peak abundance, as in mid-September, 1936, when I first noticed it, the entire river surface, except around sharp bends and in the narrows where the flow is accelerated, is for many miles literally choked with the floating plants, slowly moving down stream with the current. After copious rains or during prolonged southwesterly winds the Lemna stretches out in long ribbons or streamers, presumably due to the increased rate of flow. As would be expected, the abnormal abundance of the plant—now an annual phenomenon since 1936—varies from week to week and year to year. Short-term fluctuations appear to be related to changes in water temperature, wind and speed of the current. The stream is normally so sluggish in August and September that the rate of vegetative reproduction of the plants in mid-stream far exceeds the capacity of the river to drain them away.

It seems to be reasonably certain that we are discussing a recent phenomenon, the like of which had never before been observed for at least a hundred years. The appearance of the Lemna in 1936 caused a great deal of comment on the part of many people. Keen observers of the older generation, familiar with the river at all seasons from childhood, were quick to say

they had never seen anything like it previously. I find no allusions to any unusual or conspicuous development of Lemna or "green scum" on the river in Thoreau's or Brewster's journals. Surely each of them would have commented on it had they been alive during the present decade.

Curiously enough, a similar invasion of *Lemna minor* was noted in the Charles River (eastern Massachusetts) in 1937 and probably occurred in 1936. Mr. F. W. Hunnewell stated in correspondence (September 16, 1937) that the Charles River had been green with something all summer which, on closer examination, proved to be solid *Lemna minor*. He also referred to friends who live beside the river in Dover and who had been "talking about the unusual 'green scum' for the last couple of years". Mr. S. N. F. Sanford, in a letter of October 11, 1937, enclosed a clipping from an unidentified Boston newspaper published early in September, 1937, under the caption, "Millions of Small Plants Cover Charles". The opening sentence reported, "millions of tiny plants, resembling shamrocks in color and appearance, turned the surface of five miles of the Auburndale section of the Charles River into bright green yesterday . . ." Mr. Sanford visited the Norumbega Park section on September 26, 1937, and found a quantity of *Lemna minor* along both sides of the stream sufficient to attract attention. Mr. Edward Wright of the Massachusetts State Department of Health recently told me that there had been much complaint on the part of patrons of the public bathing places on the river at Dedham late last summer because of the great quantities of a small green plant floating on the water.

The sudden and unprecedented appearance of vast quantities of Lemna at approximately the same time in two unconnected rivers early in September, 1936, and again in 1937 suggested at the time that a somewhat ephemeral "explosion" of the species had occurred due to some extremely unusual combination of favorable factors. To check such a possibility, I examined the excellent daily meteorological records accumulated by Mr. F. A. Tower of Concord for many years. Analysis of daily, weekly and monthly maximum and minimum air temperatures gave no hint of abnormality in 1936 or 1937. Nor was the wind velocity or direction unusual for any period of time. Rainfall data were

equally disappointing. There remained the question of significant variations of soluble nutrients in the water—a question which was pigeon-holed for ten years.

The continued unusual abundance of Lemna in the Sudbury River up until the present time suggested the possibility of a definite change in ecological conditions in the river beginning in the mid-thirties. Lacking the facilities to make a thorough study of this question, I have examined the incomplete water analysis records of the Massachusetts State Board of Health to find a clue to the mystery.

Samples of Sudbury River water taken regularly for many years at several stations between its source and confluence with the Assabet have been analyzed by the State Board of Health. The records are not wholly satisfactory. Those prior to 1900 have been mislaid or lost. The reports for the years 1905–1907 are missing. Although nitrogen in the form of free and albuminoid ammonia is recorded for each sample analyzed, the data for soluble nitrates were unrecorded for the period 1916–1934. The yearly averages given in Table I are derived from analyses of samples taken at reasonably regular intervals varying from 12 to 3 times per year. From 1903 through 1944 six samplings per year between June and November was the general but not invariable practice; in 1945 the number was reduced to four (July, August, October, November). Obviously, such infrequent analyses will show misleading variations in the apparent amount of pollution. Assuming a constant volume of pollution, the analyses during a wet season will differ from those of a dry season; likewise, a sampling after a heavy summer rain may show less pollution than one taken at a low water stage of the river preceding the rain. In the table below, to minimize the chance distortions of the data, the analyses of each sampling have been averaged for each year; and for soluble nitrates these averages in turn combined into three-year averages to show trends. In Table I are shown the yearly and three-year averages for free plus albuminoid ammonia, and the soluble nitrates, all expressed in parts per one million.

That the Sudbury River has become increasingly polluted since 1900 is evident. As measured by the total free plus albuminoid ammonia content of the water, the pollution tide ebbed and

WATER ANALYSIS

Table I.—Free and Albuminoid Ammonia
(parts per 1,000,000)

	Sudbury River at Concord					Charles River at Needham				
	Ammonia			Nitrates		Ammonia			Nitrates	
	Free	Total	3 Yr. Av.		3 Yr. Av.	Free	Total	3-Yr. Av.		3-Yr. Av.
1900	.030	.271		.001		—	—			
1901	.056	.371		.089		—	—		—	
1902	.067	.336	.326	.088	.059	—	—		—	
1903	.050	.329		.057		—	—		—	
1904	.052	.373	.351	.058	.052	—	—		—	
1905	—	—		—		—	—		—	
1906	—	—		—		—	—		—	
1907	—	—	—	—		—	—		—	
1908	.049	.268		.023		—	—		—	
1909	.052	.312		.018		—	—		—	
1910	.052	.298	.293	.028	.023	—	—		—	
1911	.036	.280		.022		—	—		—	
1912	.052	.338		.023		—	—		—	
1913	.166	.495	.371	.083	.043	—	—		—	
1914	.133	.423		.072		.058	.358		.062	
1915	.137	.543		.060	.066	.064	.449		—	
1916	.123	.407	.458	—		.059	.330	.379	—	—
1917	.122	.471		—		.055	.360		—	
1918	.086	.420		—		.088	.441		—	
1919	.111	.452	.448	—		.089	.409	.403	—	—
1920	.125	.333		—		.062	.289		—	
1921	.127	.372		—		.048	.333		—	
1922	.111	.346	.350	—		.043	.238	.287	—	—
1923	.113	.318		—		.072	.294		—	
1924	.101	.286		—		.082	.296		—	
1925	.143	.402	.335	—		.108	.400	.330	—	—
1926	.096	.397		—		.084	.417		—	
1927	.163	.529		—		.069	.458		—	
1928	.113	.394	.440	—		.076	.405	.327	—	—
1929	.106	.326		—		.067	.283		—	
1930	.191	.379		—		.221	.436		—	
1931	.213	.447	.384	—		.121	.397	.372	—	—
1932	.116	.358		—		.069	.288		—	
1933	.257	.532		—		.140	.417		.118	
1934	.177	.432	.441	—		.246	.524	.410	.083	.101
1935	.196	.466		.190		.167	.563		.103	
1936	.243	.501		.340		.198	.679		.210	
1937	.178	.490	.486	.120	.217	.035	.398	.547	.200	.171
1938	.311	.640		.160		.094	.475		.270	
1939	.106	.446		.230		.023	.366		.130	
1940	.096	.502	.529	.200	.197	.040	.352	.398	.120	.173
1941	.076	.488		.250		.072	.412		.130	
1942	.311	1.296		.340		.115	.570		.170	
1943	.135	.442	.742	.170	.253	.145	.445	.476	.270	.190
1944	.206	.513		.220		.096	.461		.326	
1945	.130	.382		.480		.102	.423		.260	
1946	.047	.389	.428	.130	.277	.059	.248	.377	.175	.254

flowed from year to year, but increased each successive nine-year period. By far the greatest increase occurred in the period 1935–1943, from .421 to .586, or 39%. However, the increase was gradual until 1938. No obvious correlation exists between these data and the sudden mass invasion of Lemna in 1936.

Theoretically, the increase of the free ammonia component of the water might be significant. According to M. L. Fernald, "*Lemna minor* usually does not occur in acid or bog waters but in the sub-neutral to basic or slightly alkaline waters which sewage, etc., supply." (1) From 1900 to 1912 free ammonia varied between .030 (1900) and .067 (1902), the average for the period being .0496. From 1913 through 1929 the variation was from .086 (1918) to .166 (1913) and the seventeen year average, .122. In 1930 free ammonia at .191 was higher than in any previous year; and the average for the period 1930–1946 was .176. However, a glance at Table I will show an extremely wide variation (.213 in 1931, .116 in 1932, .243 in 1936, .311 in 1938, .106 in 1939, .076 in 1941, etc.) with no discernible pattern of change. Here, again, the data fail to give any hint as to what trigger action set off the alleged Lemna explosion in 1936.

As measured by the soluble nitrate analyses, the increase in the more readily available plant nutrients is striking. It is an exasperating "rub of the green" that the data are lacking for precisely those years when they are the most significant. The yearly, three- and nine-year averages show a relatively stable low-level nitrate component from 1900 through 1915, after which year no figures for nitrates were compiled until 1935. In that year, the average was 3.1 times the 1915 level; and the 1935–1937 average was 3.0 times the 1913–1915 average. The lowest three-year average of data from 1935 to 1946 is three times as great as the highest three-year average during 1900 to 1915.

An inspection of similar records of analyses of Charles River water sampled at Needham reveals a similar pollution pattern. The records begin with the year 1914, there being a gap in the data for soluble nitrates from 1915–1932. The average of nitrates for 1914 was .062, as compared with .072 for the Sudbury in the same year. The three-year average, 1933–1935, was .101. The average for 1936 was .210, about twice the amount recorded

in 1935, and more than three and a half times the amount recorded for 1914. From 1936 on, the three-year averages varied from a high of .255 to a low of .127. The 1936–1946 average was .206. The trend of ammonia pollution was comparable to conditions in the Sudbury, and apparently uncorrelated with the Lemna invasion.

Thus, there is a possible correlation between the increase of Lemna and the increase of river pollution, particularly in the form of soluble nitrates. It is assumed that a combination of factors has created optimum ecological conditions for the development of Lemna in the two rivers beginning in the mid-thirties. It is possible that the naturally acid water of these streams may have finally become sub-neutral or slightly alkaline as a result of the gradual increase of free ammonia, thus providing ideal conditions for rapid development of Lemna when copious supplies of nutrients became available. Doubtless there are other factors at work which some inquisitive ecologist may be tempted to investigate. A series of controlled experiments in the propagation of *Lemna minor* under varying conditions might yield interesting results. In fact, the effect of water pollution on aquatic vegetation deserves far more intensive study than has as yet been devoted to the subject, not only in the interest of pure science, but to give aid and comfort to the economic biologist on whom the population of the world will be increasingly dependent during the century to come.

The question naturally arises whether Lemna is peculiarly responsive to the increase of pollution which is tentatively proposed as responsible for its aggressive behavior. What about other aquatics? Although I lack any precise data on the subject, there seem to have been marked vegetational changes in the Sudbury River during the past fifteen years. *Trapa natans* was introduced from Europe in the river a great many years ago. There is a specimen in the Herbarium of the New England Botanical Club from Concord dated August 29, 1859. In the course of time it became generally distributed along many miles of the river and in certain favorable back waters formed dense mats a rod or two in diameter. On the whole, however, it remained relatively unaggressive and well behaved until recently. Last summer I noticed that it had taken complete possession of

long stretches of the river-margin from Fairhaven Bay to Concord Village and beyond, where ten years ago the native vegetation was predominant. In contrast, I became acutely conscious of the scarcity of *Nymphaea odorata*, formerly a conspicuous and abundant feature of the river, but now rapidly fading out even in places not yet invaded by Trapa.

Impressions are misleading, but in this case are so striking that they immediately renewed my interest in the ten-year-old Lemna problem. I asked Dr. H. B. Bigelow, who has lived beside the river for many years, if he could confirm my feeling about the recent scarcity of Nymphaea. He writes (2), ". . . it is certainly a fact that the water lilies have been very much reduced in number since the Lemna came." He also discussed "the still more spectacular explosion of the . . . water chestnut (*Trapa natans*) that took place in our part of the river summer before last and which continued during this past summer . . . All the years I have lived there (on the bank of the Sudbury River), there have been a few of them scattered among the water lilies, etc. Summer before last the thing ran wild and last summer it so multiplied in our stretch that no water at all was to be seen, except along the thread of the stream. In fact, the shallow parts looked like dry land and it was difficult to shove a canoe through it." Here is comforting corroboration of my own impressions from a competent naturalist and trained observer.

It is noteworthy that *Nymphaea odorata* occurs chiefly in neutral to slightly acid water overlying rich organic muds, whereas Trapa in its native habitat, according to Hegi, is found in "weakly calcareous but rich warm muds". (3) As for the Lemnaceae, Fassett states that "the genera . . . occur in hard water". (4)

These facts tend to support the hypothesis that alkaline sewage wastes have an important bearing on the weedy behavior of *Lemna minor* in Sudbury and Charles Rivers.

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(1) M. L. Fernald, in litt. Feb. 8, 1947.
(2) H. B. Bigelow, in litt. Feb. 18, 1947.
(3) Hegi: Ill. Flora of Middle Europe, Vol. V_2, p. 885, Munich 1925–26.
(4) N. C. Fassett, Manual of Aquatic Plants. New York, 1940.

THE DISTRIBUTION OF RED CEDAR IN EASTERN MASSACHUSETTS

A. C. Leopold

Foresters recognize two main forest associations in southern New England. One of these, the Central Hardwoods association, is characterized by white oak, black oak and hickory. This association originally covered most of Connecticut, Rhode Island and the eastern margin of Massachusetts. The other association, the Transition Hardwoods, characterized by red oak, white ash, sugar maple, red maple and black birch, originally covered most of central Massachusetts and extended north into New Hampshire and Maine.

The plant succession of old fields to oak-hickory stands of the Central Hardwoods type in Connecticut has been described by Lutz[1] as having an initial stage of red cedar and gray birch. Old fields in central Massachusetts commonly come up to white pine which gives way over a long period of time to the Transition Hardwoods. The approximate boundary in eastern Massachusetts between old fields which come up to red cedar and those which come up to white pine was mapped by Raup[2]. He suggested that this was also the boundary between Central Hardwoods and Transition Hardwoods. Naturally this is not a distinct and explicit line, but rather a transition zone.

In an attempt to analyze the boundary described by Raup, a small section of it just west of the Boston area has been mapped in considerable detail. The boundary and the area mapped are indicated in Figure I. Red cedar (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom) is found in old fields south of the boundary, and white pine in old fields north of the boundary. The area mapped is coextensive with the United States Geological Survey quadrangles of Concord, Maynard, Hudson, Natick, Framingham and Marlboro, Massachusetts, and measures seventeen by nineteen miles overall.

The mapping technique consisted of driving back and forth across the area recording the location of old fields containing red cedar or white pine visible from the road. The method has several limitations. First of all, all of the old fields in the area cannot be mapped, and the sampling is bound to be irregular

since there is no systematic checkerboard of roads. Also, the proportion of fields abandoned varies from place to place. Furthermore there is undoubtedly some selection by the farmer in favor of the pine and against the cedar. Lastly, a stand of white pine persists for over a hundred years or until cut off, whereas a stand of cedars is commonly overtopped by its fast-growing hardwood successors in only a couple of decades, and soon disappears from the stand.

In spite of the shortcomings imposed by this mapping technique, the data obtained make up something of a pattern. To show it graphically a grid system was superimposed, and the percentage of old fields containing red cedar in each grid was calculated. These percentages have been entered to the nearest ten percent in Figure II, and isopleths have been sketched in to accentuate the grouping of the percentages.

The isopleth map is simply a graphic representation of the manner in which red cedar tapers off in frequency at this transition boundary. In the mapped area the boundary runs north and south. A gradient in frequency from east to west is evident, and occasional "islands" of higher frequency can be seen west of the boundary proper.

It should be pointed out that the boundary in Figure I was not intended to encompass the range limits of red cedars. Specimens have been collected in Maine one hundred miles north of this line. However the frequency of their occurrence takes a strong drop at this boundary where they lose their position as members of the succession in old fields.

The cedar boundary in eastern Massachusetts shows rather remarkable similarities to isotherms of cold weather phenomena. The United States Weather Bureau maps (3) of average annual January temperature (26 degree isotherm), average annual minimum temperature (–10 degree isotherm), average number of days without killing frost (170 day isopleth), and the average date of last frost (April 30 isopleth) all repeat the same general pattern (Figure III). The first of these was used in Koppen's original classification of climates (4) as the boundary between warm temperate and cold temperate climates. Recognizing the limitations of Weather Bureau data as indicators of actual field conditions, nevertheless it is certainly suggestive that this vege-

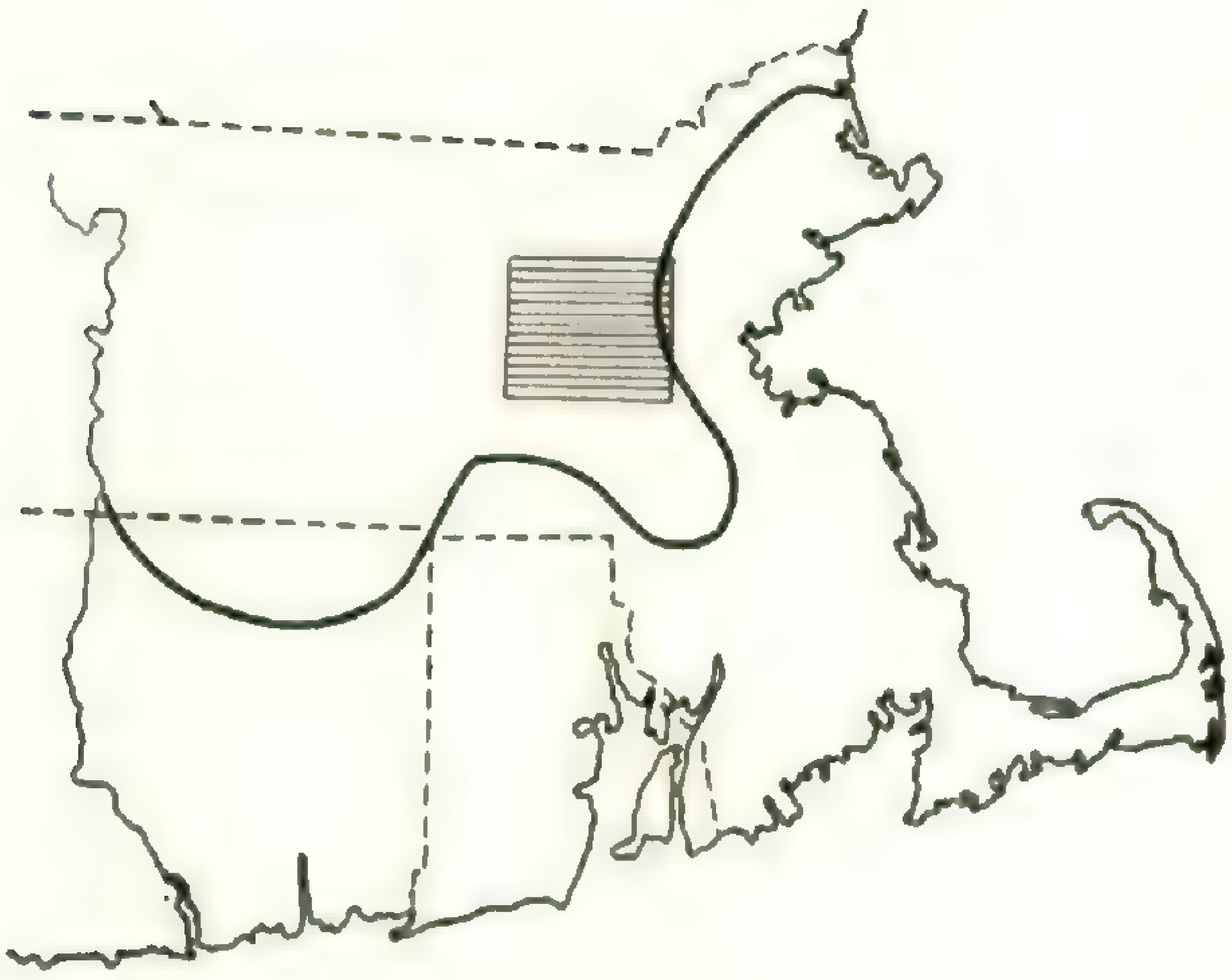

Figure I. The approximate northern boundary of old field red cedar in southern New England, and the area mapped in this study.

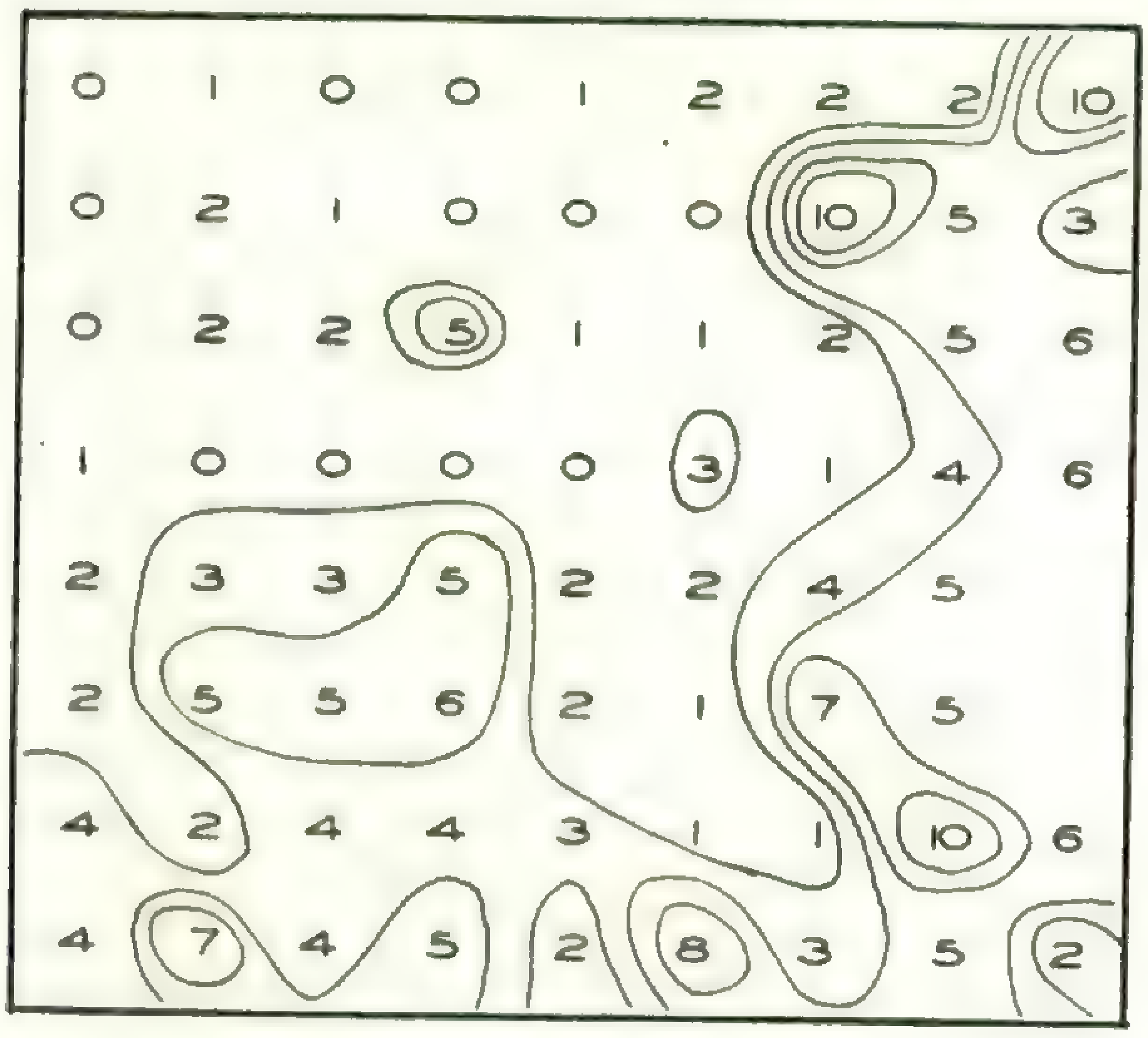

Figure II. Frequency distribution of red cedar in the area mapped. Percentages of fields containing cedar are indicated in tens, and isopleths are drawn in at 20% intervals.

Figure III. Comparison of the red cedar boundary with:

—·— Ave. annual Jan. temperature (26 degree isotherm)

—··— Ave. annual minimum temperature (−10 degree isotherm)

—···— Ave. days without killing frost (170 day isopleth)

—····— Ave. date of last frost (April 30 isopleth).

tation boundary should approximate in considerable measure the same general pattern as *four* low temperature phenomena.

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(2) RAUP, H. M., Old field forests of southeastern New England. Jour. Arnold Arboretum XXI, 266–273. 1940.
(3) U. S. DEPARTMENT OF AGRICULTURE, Climate and Man. Washington. 1941.
(4) KOPPEN, W., AND R. GEIGER, Handbuch der Klimatologie, Berlin. 1936.

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. FERNALD

(*Continued from page 159*)

*GENTIANA CATESBAEI Walt., var. **nummulariaefolia,** var. nov. (TAB. 1078, FIG. 3 et 4), a var. typica recedit folliis elliptico-ovalibus utrinque obtusis vel subrotundis 1–1.8 cm. longis 6–12 mm. latis membranaceis; calycis lobis late oblanceolatis ad 4.5 mm. latis.—Greensville County, VIRGINIA: sphagnous bog about 1 mile northwest of Dahlia, October 12, 1938, *Fernald & Long*, no. 9618 (TYPE in Herb. Gray.).

Gentiana Catesbaei, var. *nummulariaefolia* has for several years stood apart in the herbarium from all other material of the species and it seems very definite. Typical *G. Catesbaei* (PLATES 1078, FIGS. 1 and 2, and 1079), frequent in southeastern Virginia, has firm narrowly lanceolate to oblong-ovate acute or subacute leaves mostly 3–7 cm. long, though in the most extreme dwarfs down to 1.5 cm. but acutish; and its calyx-lobes are linear or narrowly lanceolate. Var. *nummulariaefolia,* on the other hand, has small membranaceous blunt or round-tipped elliptic-oval leaves only 1–1.8 cm. long, and its dilated calyx-lobes are broadly oblanceolate.

As I pointed out in RHODORA, xli. 555 (1939), Walter had two species of *Gentiana* with campanulate-ventricose corollas. What he took for *G. Saponaria* L. was described "corollis viridescentibus, foliis ovatis trinerviis" and (as shown by Walter's

material) was the misnamed greenish-flowered *G. villosa* L. Since *G. villosa*, as shown by its type, is strictly glabrous, Walter, quite naturally, did not so identify his greenish-flowered plant. Walter's *G. Catesbaei* was defined "corollis extus caeruleis, foliis lanceolatis remotis". The material in Walter's Herbarium shows, besides a summit of *G. villosa*, one of true *G. Saponaria* L. The other two specimens (our PLATE 1078, FIGS. 1 and 2) are the new element, *G. Catesbaei*, the larger specimen (FIG. 1) so marked by the late James Britten (apparently). Besides them (PLATE 1079) I am showing summits of two modern specimens from eastern Virginia. These are of the plant described from "Pine-barren swamps near the coast, Georgia and Florida", as *G. Elliottii* Chapm., var. *parvifolia* Chapm. Fl. So. U. S. 356 (1860), specimens before me, and which has been variously known as *G. Elliottii* Chapm., *G. parvifolia* (Chapm.) Britton and *Dasystephana parvifolia* (Chapm.) Small. Since some have doubted the identity of *G. Catesbaei* I am showing the type-material.

Although Walter did not cite Catesby's plate, his intent in giving the name *G. Catesbaei* is pretty obvious. As M. A. Curtis wrote in Bost. Journ. Nat. Hist. i. 128 (1835): "*Gentiana Catesbaei.* This species is readily distinguished from G. saponària, by the long linear segments of the calyx and its open corolla. It is finely delineated in Bigelow's Medical Botany. Tab. 70. of Catesby's Carolina, represents it". Both Bigelow's plate of *G. Catesbaei*, received from Charleston, South Carolina, and Catesby's are indeed very fine; and Bigelow pointed out that it is not *G. Saponaria* for "It differs widely, however, from that species in the size of its leaves, the length of its calyx, the open mouth of its corolla and shape of its segments." Catesby, like Bigelow, showing the open summit of the corolla, said "blue flowers; which, before they open, are in form of a Rolling-pin; but, when blown, are in shape of a Cup, with the verge divided into five sections". There should be no question about the identity of *G. Catesbaei.*

Bartonia verna (Michx.) Muhl. In Rhodora, xlviii. 327 (1946) I explained my reasons for believing that the basis of the record of this vernal species from Virginia was a confusion made by Pursh in 1814. If the species is later found in the state it will presumably be as a considerable northern extension of range.

PHACELIA MACULATA Wood, Am. Bot. Fl. 255 (1873). *P. fallax* Fernald in RHODORA, xlvi. 51, t. 814 (1944).

Dr. Lincoln Constance calls my attention to Wood's species from Stone Mountain (type-region of *Phacelia fallax*), Wood's species very generally overlooked by American botanists and somewhat obscured by the entry in Index Kewensis "Quid?".

SCUTELLARIA INTEGRIFOLIA L., var. HISPIDA Benth. To the stations in Norfolk and Gloucester Counties cited by Epling in Univ. Calif. Publ. xx. 93 (1942) add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald & Moore*, no. 15,149. See p. 94.

*S. INTEGRIFOLIA, var. MULTIGLANDULOSA Kearney (*S. multiglandulosa* (Kearney) Small). Range extended north from Georgia. NANSEMOND COUNTY: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,345. SOUTHAMPTON COUNTY: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,346.

Close matches for specimens identified by Epling as an "unusually stable" species, *Scutellaria multiglandulosa*, although it is difficult to believe that the "stability" would hold over a considerable area and that *S. multiglandulosa* is more than a somewhat minor variation of *S. integrifolia*, perhaps extending still farther north. Epling, l. c. 94, cites 18 collections of var. *multiglandulosa* (his *S. multiglandulosa*). Under 4 citations he adds: "occurs here with *S. integrifolia* subsp. *hispida*" or phrases of the same import. In Nansemond County the two are in bogs toward a mile apart! See pp. 99 and 101.

*LYCOPUS EUROPAEUS L., var. MOLLIS (Kern.) Briq. Numerous stations in southeastern Virginia. NORFOLK COUNTY: old collection from Norfolk, coll. *Rugel?*; between Princess Anne and Berkely, *Heller*, no. 1072. NANSEMOND COUNTY: border of fresh to brackish marsh, near Western Branch, south of Reid's Ferry, *Fernald & Long*, no. 13,438. ISLE OF WIGHT COUNTY: along path, Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *F. & L.*, no. 12,791. SURRY COUNTY: springy swale by Cobham Bay, James River, northwest of Chippokes, *F. & L.*, no. 12,790; roadside by sandy thicket, Sunken Meadow Beach, *F. & L.*, no. 6865.

Typical *Lycopus europaeus* L., recorded from Virginia but not seen from there by me, has the leaves broadly lanceolate to nar-

rowly ovate, acuminate, the lower and median primary ones deeply pinnatifid or incised, with the longest teeth or lobes 1–4 cm. long, the upper surface strigose, the lower surface but slightly pubescent to glabrescent. It is occasional in waste near Boston and is represented by *House*, nos. 19,639 and 20,772 from Monroe County, New York. Most eastern American specimens belong to var. *mollis*, which has smaller oval, obtuse to subacute leaves with short and blunt teeth and villous or soft-pilose beneath.

Physalis pubescens L. Add another station in Nansemond County: wet peaty and sandy shore of Exchange Pond, southwest of Everett's Bridge, *Fernald, Long & Clement*, no. 15,348.

*P. heterophylla Nees, var. **clavipes,** var. nov. (tab. 1080 et tab. 1081, fig. 4 et 5), rhizoma sublignea 1 cm. crassa; caule basin versus subligneo ad 1.5 cm. crasso; internodiis pilosis glandulosisque, pilis confertis 0.5 mm. longis; foliis membranaceis translucentibus, venis venulisque conspicuis, subtus villoso-strigosis, margine divergenter acute dentato.— Southampton County, Virginia: sandy woods near Darden's Pond, northeast of Courtland, September 16, 1946, *Fernald, Long & Clement*, no. 15,347 (type in Herb. Gray.; isotype in Herb. Phil. Acad.). See p. 102.

In its thick, subligneous and heavy deeply buried horizontal rhizome, its strongly subligneous subterranean (often clubshaped) vertical base of the fruiting stem, in the very thin and conspicuously veiny leaves, very evidently translucent to transmitted light, var. *clavipes* stands out from the other three recognized varieties of *Physalis heterophylla*. Typical *P. heterophylla* (plate 1081, figs. 1–3), has the horizontal rhizome (fig. 1) slender and cord-like and the buried vertical base of the stem relatively slender and not ligneous, the leaves less prominently toothed and, when illuminated from below (fig. 3), appearing dense and opaque. The pubescence of the internodes is dense, with abundant glands and very short intermixed pilosity. Var. *ambigua* (Gray) Rydb. (plate 1082, figs. 1–3) has the slender rhizome and base of stem, but its internodes are spreading-villous with slender trichomes up to 2 or 3 mm. long and its leaves are thick as in typical *P. heterophylla* and (fig. 3) nearly as opaque. Var. *nyctaginea* (Dunal) Rydb. (figs. 4–6) has the slender rhizome and base of stem and the pubescence of internodes as in var. *ambigua*, but the only slightly toothed or entire leaf is thin and membranaceous and subtranslucent but without

the very obvious veins and veinlets of var. *clavipes*. All the four varieties occur in southeastern Virginia. To clear the record, specimens from the southeastern counties are cited below.

P. HETEROPHYLLA Nees (typical). PRINCE GEORGE COUNTY: rich alluvial woods and thickets by James River, Upper Brandon, *Fernald & Long*, no. 9425. SUSSEX COUNTY: border of dry sandy woods, 4 miles south of Stony Creek, *Fernald, Griscom & Long*, no. 6684, in somewhat thickened and subligneous base and in toothing of leaves transitional to var. *clavipes*.

P. HETEROPHYLLA, var. AMBIGUA (Gray) Rydb. ISLE OF WIGHT COUNTY: dry sandy woods about 1 mile north of Pons, *Fernald & Long*, no. 13,440; sand-beach along James River, Ragged Island, northeast of Carrollton, *Fernald & Long*, no. 12,795.

*P. HETEROPHYLLA, var. NYCTAGINEA (Dunal) Rydb. PRINCE GEORGE COUNTY: rich alluvial thicket back of sand-beach of James River, Jordan Point, *Fernald & Long*, no. 9427. SURRY COUNTY: rich alluvial woods and thickets back of sand-beach of James River, Eastover, *F. & L.*, no. 8840. SOUTHAMPTON COUNTY: dry sandy old clearing near Nottoway River, north of Smith's Ferry, *Fernald & Long*, no. 8841. GREENSVILLE COUNTY: open thickets, clearings, and borders of woods southeast of Emporia, *F. & L.*, no. 9428. Several collections from western counties.

PENSTEMON CANESCENS Britton. Range extended from the outer Piedmont well out into the Coastal Plain. HENRICO COUNTY: rich wooded slopes by James River, west of Varina, *Fernald & Long*, no. 13,133. PRINCE GEORGE COUNTY: dry wooded slopes of gullies near Powell's Creek, Garysville, *F. & L.*, no. 8456. SUSSEX COUNTY: dry sandy hickory and oak woods, Burt, *F. & L.*, no. 6385 (distrib. as *P. australis* Small). Identifications confirmed by Dr. Pennell.

Penstemon canescens adds another to the long list of primarily montane species with extensions out to the Coastal Plain, for Pennell, Scroph. E. Temp. N. Am. 221, and map 48, p. 219 (1935) found it to be a plant of "the Appalachian Mountains, both Eastern and Western . . .; eastward descending along rivers into the Piedmont, . . . on the James River reaching nearly to the Fall Line." At Varina it is associated with many inland or upland plants: *Carex conjuncta* Boott, *C. tenera* Dewey, *C. normalis* Mackenz., *Xanthorhiza simplicissima* Marsh., *Corydalis flavula* DC., *Scutellaria elliptica* Muhl., var. *hirsuta* (Short) Fern. (first station east of Blue Ridge), etc. Along Powell's

Creek it is associated with many prevailingly inland species: *Carex Frankii* Kunth, *Stellaria pubera* Michx., *Ranunculus micranthus* Nutt., *Sedum ternatum* Michx., *Phaseolus polystachios* (L.) BSP., *Ruellia strepens* L. and *Chrysogonum virginianum* L. The patch of hickory and oak woods near Burt is, as pointed out in Rhodora, xxxix. 342 (1937), a bit of upland forest on the Coastal Plain, with such inland species as *Festuca paradoxa* Desv., *Hexalectris spicata* (Walt.) Barnh., *Clematis ochroleuca* Ait., *Lathyrus venosus* Muhl., *Scrophularia marilandica* L. and *Houstonia tenuifolia* Nutt. *Penstemon canescens*, pushing out to the Coastal Plain, stays with its inland associates.

Chelone obliqua L. To the few recorded stations add another in Nansemond County: along rill in rich sandy and loamy oak and hickory woods just east of Suffolk, *Fernald, Long & Clement*, no. 15,350. See p. 96.

*Galium tinctorium L., var. floridanum Wiegand in Bull. Torr. Bot. Cl. xxiv. 397 (1897). Range extended north from Florida. Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,358; wet sandy soil, Cape Henry, *L. F. & Fannie R. Randolph*, no. 332, as *G. Claytoni;* marshes bordering ponds, Dam Neck, *Fernald & Long*, no. 4206, as *G. Claytoni*. Southampton County: alluvial woods, bottomland of Mill Creek, Hart's Bridge, *F. & L.*, no. 8481, as *G. Claytoni*. See p. 100.

Wiegand, in his early revision of the group, treated *Galium tinctorium* as a heteromorphic species, his *G. tinctorium* proper being the plant we now know as *G. obtusum* Bigelow; his *G. tinctorium*, var. *filifolium* being *G. obtusum*, var. *filifolium* (Wieg.) Fernald; and his *G. tinctorium*, var. *labradoricum* being the wholly different *G. labradoricum* (Wieg.) Wieg. Wiegand treated as *G. Claytoni* Michx. a very weak plant with the leaves scabrous- or bristly-margined, the sprawling stems with prostrate, matted basal offshoots and 3 (sometimes 4)-lobed corollas at most 1.5 mm. broad. This plant, as shown by me in Rhodora, xxxvii. 443–445, plate 403, figs. 1 and 2 (1935), is really the true *G. tinctorium* of Linnaeus, while *G. tinctorium* sensu Wiegand is *G. obtusum* Bigelow, Fl. Bost. ed. 2: 54 (1824). Although *G. tinctorium* sensu Wiegand was not the true *G. tinctorium* of Linnaeus, and although *G. tinctorium*, var. *labradoricum* Wiegand and *G. tinctorium*, var. *filifolium* Wiegand are not conspecific with the Linnaean *G. tinctorium* (*G. Claytoni* Michx.), it so hap-

Photo. B. G. Schubert

GENTIANA CATESBAEI: FIGS 1 and 2, Walter's TYPE, after photo. from Dr. *J. Ramsbottom*
Var. NUMMULARIAEFOLIA: FIGS. 3 and 4, TYPE, × 1

Photo. B. G. Schubert

GENTIANA CATESBAEI: FIGS. 1 and 2, inflorescences, × 1, of modern specimens

Photo. B. G. Schubert

Physalis heterophylla, var. clavipes; all figs. from type: fig. 1, portion of fruiting plant, × 1; fig. 2, a large leaf, × 1; fig. 3, pubescence of stem, × 10; fig. 4, a base, with portion of horizontal subterranean rhizome, × 1

Photo. B. G. Schubert

Physalis heterophylla: fig. 1, base of plant and leaf at upper right, × 1; fig. 2, pubescence of stem, × 10; fig. 3, leaf, × 1, illuminated from below

Var. clavipes, both figs. from type: fig. 4, leaf, × 1, illuminated from below; fig. 5, base of large plant, × 1

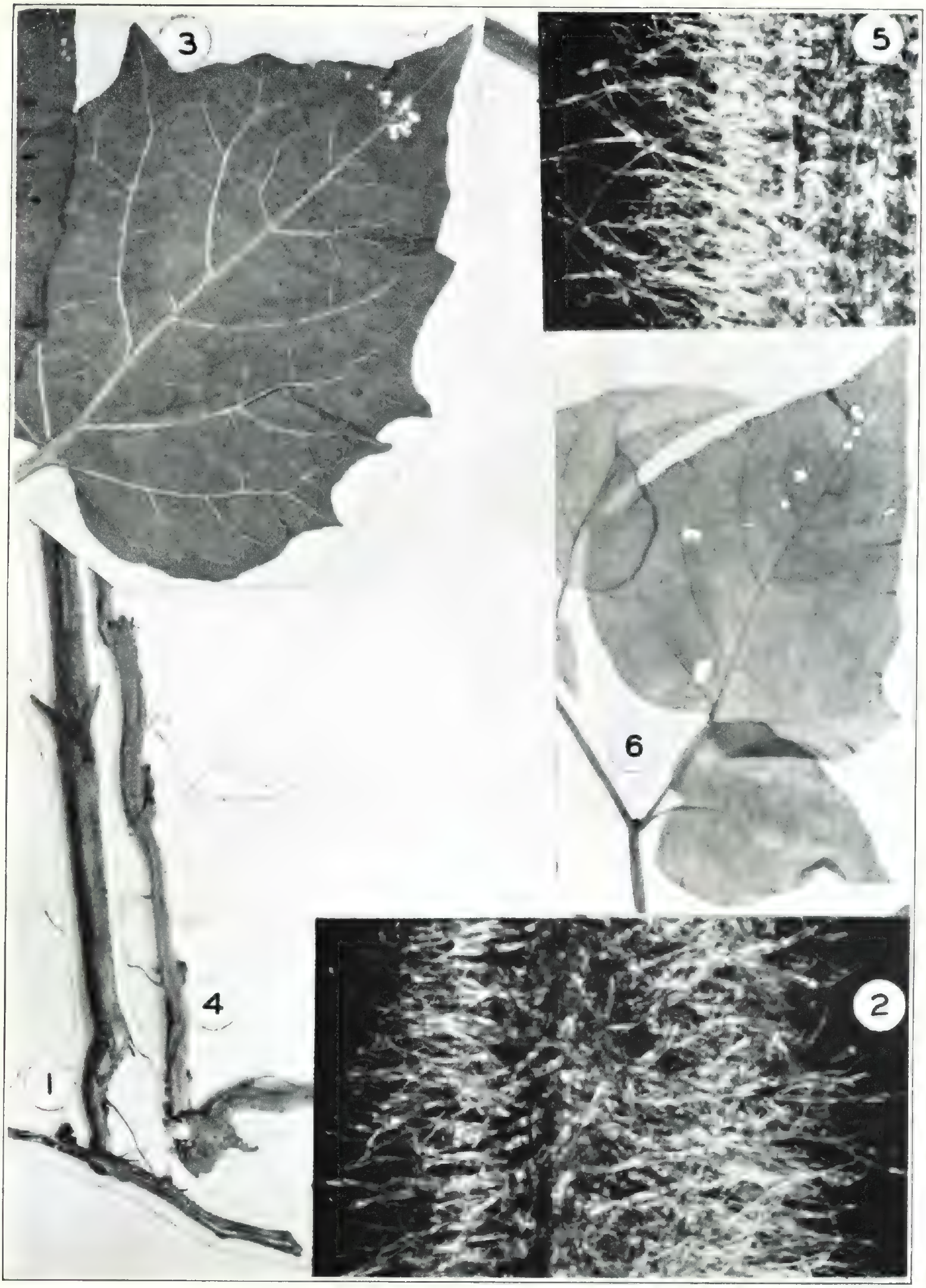

Photo. B. G. Schubert

PHYSALIS HETEROPHYLLA, var. AMBIGUA: FIG. 1, base, × 1; FIG. 2, pubescence of stem, × 10; FIG. 3, leaf, × 1, illuminated from below

Var. NYCTAGINEA: FIG. 4, base, × 1; FIG. 5, pubescence of stem, × 10; FIG. 6, leaves, × 1, illuminated from below

Photo. I. D. Clement

HELIANTHUS ANGUSTIFOLIUS, var. PLANIFOLIUS, portions of TYPE, × 1; FIG. 1, base of plant; FIG. 2, median leaves; FIG. 3, involucre

Photo. I. D. Clement

HELIANTHUS ANGUSTIFOLIUS: FIG. 1, TYPE, × ca. ¼; FIG. 2, perennating base of plant, × 1

Photo. I. D. Clement

HELIANTHUS FLORIDANUS: FIGS. 1 and 2, portions of TYPE, × 1; FIG. 3, stoloniferous base, × 1

pens that *G. tinctorium*, var. *floridanum* is a southeastern large-fruited extreme of the Linnaean species!

Whereas true *Galium tinctorium* has the mature pairs of fruits relatively small (2–3 mm. across), var. *floridanum* has them larger, the pairs measuring 3.5–5 mm. across. The longest peduncles of true *G. tinctorium* range from 10–17 mm. long but the longest in var. *floridanum* are up to 23 mm. long, while the longest pedicels of typical *G. tinctorium* are 4–8 mm. long, those of var. *floridanum* ranging up to 13 mm. long. Furthermore, var. *floridanum* often bears long unforking and recurving very slender peduncles suggestive of those of the more northern *G. trifidum* L. Although var. *floridanum* was described only from Florida, it extends along the Coastal Plain of South and North Carolina into southeastern Virginia. The record in Rhodora, xxxvii. 178 (1935) was based on the very large-fruited and smooth *G. obtusum* Bigel., var. *filifolium* (Wiegand) Fern.

Diodia teres Walt., var. hystricina Fern. & Griscom. Add another station in Princess Anne County: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, nos. 15,354 (simple, crowded, upright plants) and 15,355 (depressed, freely branching). See p. 100.

*Cephalanthus occidentalis L., forma **lanceolatus,** f. nov., foliis oppositis lanceolatis vel lanceolato-oblongis utrinque attenuatis submembranaceis subtus pallidis, laminis 4–9 cm. longis 1–3 cm. latis.—Southampton County, Virginia: wet thicket bordering Darden's Pond, north of Courtland, September 16, 1946, *Fernald, Long & Clement*, no. 15,357 (type in Herb. Gray.; isotype in Herb. Phil. Acad.). See p. 101.

Cephalanthus occidentalis in its typical form has the leaf oblong-ovate and abruptly short-acuminate. It varies from small-leaved extremes at the northern border of its range, with blades only 4 cm. long and 2.3 cm. broad, to the largest-leaved shrubs or small trees of the southeastern states, with blades up to 2.5 dm. long and 1.5 dm. broad, the leaves either opposite or in 3's. Forma *lanceolatus*, with narrowly lanceolate leaves attenuate to both ends grows at its type-station with the ordinary broad-leaved shrub and strongly contrasts with it.

Although several authors treat the Mexican *Cephalanthus salicifolius* Humb. & Bonpl., as a narrowly lance- or linear-leaved variety of *C. occidentalis*, *C. occidentalis*, var. *salicifolius* (Humb. & Bonpl.) Gray, Syn. Fl. i^2. 29 (1878), they overlook the very

narrow (essentially linear) and elongate outline, the coriaceous texture and the obscure lateral nerves of the latter (and other characters), *C. occidentalis* and forma *lanceolatus* having thinner leaves with the lateral nerves quite evident.

It is possible that forma *lanceolatus* is the shrub cultivated in Europe as the ill-begotten *C. angustifolius* Hort. ex André in Rev. Hort. 1889, 280, 281, fig. 70 (1889) and Dippel, Handb. Laubholzk. i. 164 (1889), this in both cases treated as *C. occidentalis*, var. *angustifolius* André l. c., based on the horticultural binomial *C. angustifolius* Hort. ex André (1889), not Lour. Fl. Cochinch. i. 67 (1790). Since, according to Haviland, *Revision of the Naucleeae*, in Journ. Linn. Soc. xxxiii. 39 (1897), *C. angustifolius* Lour. of Cochinchina has the coriaceous very short-petioled leaves oblong-linear (in *C. occidentalis* oblong-ovate to -lanceolate and membranaceous), the peduncles ebracteate (in *C. occidentalis* with small bracts), the calyx-lobes linear (in *C. occidentalis* ovate), etc., it is evident that the cultivated shrub in European gardens has nothing to do with *C. angustifolius* Lour.; neither does the narrow-leaved form of *C. occidentalis*. I am, therefore, not taking up the later and rather vaguely founded *C. occidentalis*, var. *angustifolius* André.

Viburnum nudum L., var. angustifolium Torr. & Gray. New stations. Nansemond County: wet *Sphagnum* of pine-barrens east of Cherry Grove, south of South Quay, *Fernald & Moore*, no. 15,154, flowering shrubs only 4–6 dm. high. Sussex County: swampy depression in sandy pinelands 3 to 4 miles northwest of Waverly, *Fernald, Long & Clement*, no. 15,360. See p. 93.

The Geographic Varieties of Lobelia puberula.—In his Flora Boreali-Americana, ii. 152 (1803) Michaux described *Lobelia puberula:*

> L. erecta, simplicissima, pubescens: foliis oblongo-ovalibus, obtusis, repando-serrulatis: spica non pedunculata; floribus paucis, alternis, subsessilibus: calycibus ciliatis. *Hab.* in Carolina.

This was regularly taken to be the definitely pubescent plant of coastwise distribution in the Atlantic states, with the calyx-tube densely whitish-hirsute to -villous. When he studied Michaux's Herbarium in Paris in 1851 Asa Gray made a memorandum indicating that the specimen is what he knew and in his

Manual (1848) had described as *L. puberula: "minutely downy-pubescent; leaves ovate or oblong, obtuse,* . . . leafy bracts ovate, acute, serrate as long as the flower, *lobes of the calyx scarcely shorter than the corolla, the auricles as long as the hairy tube*". Again, when I studied the Michaux Herbarium in 1903, I similarly recorded that the type of *L. puberula* was the coastwise plant we know by that name. That is as it should be, for this pubescent plant so clearly matches Michaux's description and his plant came from Carolina. Michaux generally treated the two Carolinas as one but occasionally North Carolina appeared as Carolina superior, South Carolina as Carolina inferior; but he made a sharp distinction between the Coastal Plain and outer Piedmont region and the high mountains, plants of the latter area growing "in montibus Carolinae", "a Pensylvania ad Carolinam, per montium tractus", "a Canada ad Carolinam montosam". His pubescent *Lobelia puberula* simply from "Carolina" was obviously from east of the mountains, whence there are in the Gray Herbarium 8 sheets (4 from 4 counties in eastern North Carolina, 4 from 3 counties in eastern South Carolina, as well as specimens from 10 counties on the Coastal Plain of Virginia).

In Rhodora, xxxviii. 292 (1936) McVaugh stated that "There is no material of this species in the Michaux Herbarium in Paris". In view of the fact that Asa Gray found and studied it in 1851 and that I did likewise in 1903, it was evident that Michaux's material had existed. Professor Jacques Rousseau, expecting to visit Paris in the autumn of 1946, most kindly offered to look into the matter. Forced to abandon his plan, he communicated with M. J. Léandri of the Muséum d'Histoire Naturelle, who writes that the type of *Lobelia puberula* had merely been misplaced and that "As to the calix, it is similar to the sample of 'B' which Prof. Fernald has sent."

In his study of the genus McVaugh broke *Lobelia puberula* into 4 "pronounced geographic forms which may or may not be worthy of varietal names" (Rhodora, xxxviii. 293 (1936)), saying (p. 292) "In the absence of type material, and in view of the variability of the forms [on the next page they were "pronounced geographic forms"], it seems impossible at present to determine the exact identity of *L. puberula* of Michaux". Under other species with pronounced geographic segregation, as in *L.*

spicata, he definitely called such plants varieties. In view of his "Form a" concentrating itself on the Appalachian Upland and Cumberland Plateau, his "Form b", "on the southeastern Coastal Plain and adjacent Piedmont, New Jersey and Pennsylvania south to Georgia", this the plant described by Michaux from Carolina and checked by Asa Gray in 1851, by myself in 1903, "Form c" "Alabama to Louisiana, especially on the Coastal Plain", and "Form d", Missouri and Arkansas southward to eastern Oklahoma and Texas, and eastward to Alabama and southern Mississippi"—in view of these geographic segregations (much greater than in the admitted varieties of *L. spicata*), it would seem that the 4 extreme and largely isolated trends in *L. puberula* are quite as clear varieties as are those of *L. spicata*. The typical *L. puberula* being the eastern pubescent coastwise plant so adequately described by Elliott with "Tube of the *calyx* short, villous, the segments lanceolate, ciliate, three times as long as the tube" and by McVaugh as his form b with "a densely long-hirsute calyx", etc., we may designate the other three varieties.

*Var. **simulans**, var. nov., a var. typica recedit caule minute puberulo, foliis patentibus, bracteis lanceolatis vel linearibus, tubo calycis glabrescenti vel sparse pubescenti lobis lineari-lanceolatis 1.5–2 mm. latis. Form a of McVaugh in Rhodora, xxxviii. 293, fig. 12 (1936)—West Virginia to Illinois, south to Florida, Alabama, Mississippi and Louisiana, largely on the upland. Type: Wytheville, Wythe County, Virginia, Sept. 16, 1878, *Howard Shriver* (in Herb. Gray.). The asterisk used since the variety is here named for the first time.

Var. **obtusifolia** (A. DC.), comb. nov. *L. glandulosa*, γ. *obtusifolia* A. DC. in DC. Prodr. vii. 378 (1839). *L. puberula*, β. *glabella* Hook. Bot. Mag. lxi. t. 3292 (1834), not Ell. Sk. i. 267 (1817). *L. puberula*, var. *laeviuscula* Mohr in Contrib. U. S. Nat. Herb. vi. 750 (1901). Form c of McVaugh, l. c. 296 (1936) —Alabama to Louisiana.

I get no difference between the type (in Gray Herb.) of Alphonse De Candolle's *Lobelia glandulosa* γ. *obtusifolia* and the original of *L. puberula* β. *glabella* Hook., nor from the Drummond material from Louisiana from seed of which Hooker's plant was grown. Hooker's varietal name has to be discarded under *L. puberula* on account of *L. puberula*, var. *glabella* of Elliott.

The latter, from Chatham County, Georgia, was defined as follows: "with a stem 12–18 inches high, very smooth; leaves

linear lanceolate, obscurely denticulate; margins of the calyx slightly reflexed. Seems to be an intermediate plant between this species [*L. puberula*] and L. glandulosa". Its exact identity may never be settled, for the specimen is apparently lost. At least, in studying all the types preserved in Elliott's herbarium at the Charleston Museum, Weatherby in RHODORA, xliv. 256 (1942) found nothing to show for it. In his treatment of *L. puberula* McVaugh (p. 292) says of Elliott's variety "probably *L. elongata Small*"; and again (p. 284) "was probably *L. elongata* Small, as was *L. puberula* var. *glabella,* Elliott", but in his discussion of *L. elongata* itself he made no mention of the supposed synonym. Whatever Elliott had, his name invalidates the use of the same appellation for another plant. His diagnosis is to me quite as close to McVaugh's description of *L. glandulosa* Walt. as to that of *L. elongata.* Incidentally Small's *L. elongata* was originally given a very inclusive description but the TYPE was from Northwest in southeastern Norfolk County, Virginia, Small describing the "sepals elongated . . . , entire, as long as the corolla or shorter", while for *L. glandulosa* Small correctly described the "corolla . . . tube much longer than the calyx". The plant at Northwest, type-locality of *L. elongata,* is confined to fresh to brackish tidal reed-marshes along the river and it also abounds on the adjacent fresh to brackish tidal marshes (there as at Northwest, along with *Scirpus Olneyi* and other halophytes or near-halophytes) of North Landing River. Messrs. Griscom, Long or Fogg and I have collected it either at the type-locality or nearby and Mackenzie also got it. I have before me 8 beautiful sheets of it, all quite consistent (except that in one the inflorescence is paniculate-branched). The brittle stem is 0.45–1.5 m. high and all but the most crowded and etiolated ones 4–6 mm thick at base. The leaves are linear- to oblong-lanceolate or oblanceolate, entire or dentate, submembranaceous, the median ones 0.5–2.5 cm. wide; the median bracts of the raceme are linear-lanceolate and 1–2.5 cm. long; the flowering calyx is 1–1.7 cm. long, its non-glangular segments about two thirds as long as the corolla-tube; seeds 0.8–1 mm. long, reticulate-pitted, with cells 3–10 times as long as broad. As already noted, *L. elongata* is a plant of brackish to fresh tidal reed-marsh. Frequently and needlessly confused with *L. elongata* are plants of *L. glandulosa*

Walt., var. with glabrous, instead of densely chaffy-hirsute, calyx-tube, the plant more slender than *L. elongata*, its subcoriaceous leaves linear to linear-lanceolate and mostly 2–8 (rarely –15) mm. broad, the principal bracts of the raceme 0.5–1.8 cm. long, the calyx 6–15 mm. long, its segments usually much shorter than the corolla-tube; seeds 0.5–0.6 mm. long, its pits mostly shorter and more uniform than in *L. elongata*. *L. glandulosa* is a plant of fresh-savannas, pinelands and pine-barrens.

The variety of *Lobelia glandulosa* with glabrous calyx-tube was distributed by M. A. Curtis as *L. glandulosa*, var. *glabra*, he perhaps thinking it the *L. glandulosa* β. *glabra* A. DC. l. c. 378 (1839), from South Carolina, but, unfortunately, Alphonse DeCandolle described the "Foliae ovato-acuta", which will not do for *L. glandulosa*. The variety under discussion may be called

L. glandulosa Walt., var. **laevicalyx,** var. nov. a var. typica recedit tubo calycis glabro.—Florida to eastern North Carolina. Type in Herb. Gray.: swampy pineland at Middlesex, Nash County, North Carolina, October 9, 1938, *Godfrey & Kerr*, no. 6661 (distrib. as *L. elongata*).

Returning to the varieties of *Lobelia puberula*, the two remaining varieties here need little further comment. McVaugh's "Form d" is, as he states, var. *mineolana* E. Wimmer in Fedde, Repert. Spec. Nov. xxvi. 4 (1929).

Eupatorium recurvans Small. To the stations about the Great Dismal Swamp in Norfolk Co. add one in Princess Anne County: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, nos. 15,363 and 15,364, both nos. showing the fleshy and often 2- or 3-forked tuberous roots which characterize this southeastern species. See p. 101.

Liatris.—The monograph of *Liatris* by Dr. L. O. Gaiser, in Rhodora, xlviii, August to December (1946) contains records of several Virginian species and varieties. That the record may be quickly available I am noting these here.

L. spicata L. (var. typica Gaiser). Recorded only from Fairfax, Montgomery and Giles Cos. See Gaiser, l. c. 180.

L. spicata, forma montana (Gray) Gaiser, l. c. 216. Bath Co.

*L. spicata, var. resinosa (Nutt.) Gaiser, l. c. Virginian stations cited in Sussex and Dinwiddie Cos. To these add one in Nansemond County: sphagnous and peaty bog by the Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,365. See p. 98.

L. GRAMINIFOLIA (Walt.) Willd. (var. TYPICA Gaiser, l. c. 248). Many stations cited, from Arlington Co. to Princess Anne Co., thence westward across the Coastal Plain.

L. GRAMINIFOLIA, var. DUBIA (Barton) Gray. See Gasier, l. c. 250. Stations cited from Arlington Co. to the mountains and down the Coastal Plain to Princess Anne, Sussex and Greensville Cos.

L. GRAMINIFOLIA, var. SMALLII (Britt.) Fern. & Grisc. See Gaiser, l. c. 253. Cited only from the montane counties. Found at inner margin of Coastal Plain in western SUSSEX COUNTY: damp sandy pine and oak woods south of Stony Creek, *Fernald & Long*, no. 11,455.

*L. TURGIDA Gaiser, l. c. 261. Many stations from the Blue Ridge westward.

*L. REGIOMONTANIS (Small) K. Schum. Cited from Wythe Co. See Gaiser, l. c. 277.

L. SCARIOSA (L.) Willd. (var. TYPICA Gaiser, l. c. 294). Cited from many stations in the western counties.

L. SCARIOSA, var. VIRGINIANA (Lunell) Gaiser, l. c. 296. Many stations in the western counties.

L. SQUARROSA (L.) Michx. (var. TYPICA Gaiser, l. c. 394). Stations south to Greensville and Mecklenburg and westward.

LIATRIS ELEGANS NOT VIRGINIAN.—Although the somewhat unique *Liatris elegans* (Walt.) Michx. had its recorded range suddenly extend northward from South Carolina in Gray Man. ed. 2:184 (1856), where it was said to grow in "Barren soil, Virginia?", the doubt was fully justified, for Dr. Gaiser, examining the material in most American herbaria could find no evidence of it from north of South Carolina—see RHODORA, xlviii. 341 (1946).

CARPHEPHORUS TOMENTOSUS (Michx.) Torr. & Gray, var. WALTERI (Ell.) Fernald. To the stations farther inland in dry pine-barren add two in boggy habitats in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,366; similar habitat 1–1½ miles west of Kilby, *F. L. & C.*, no. 15,367. See p. 98.

CHRYSOPSIS NERVOSA (Willd.) Fern., var. STENOLEPIS Fern. To the few recorded stations add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,368.

Our previous stations in dry pine-barren.

*C. MARIANA (L.) Ell., forma EFULGENS Fern. in RHODORA, xlviii. 60 (1946). Rayless form from 2 stations in SUSSEX COUNTY.

*Solidago juncea Ait., var. **neobohemica,** var. nov., a var. typica recedit involucro 3–4 mm. alto, phyllariis dorso intense viridibus; ligulis 3.5–3.8 mm. longis; corollis disci 3–3.4 mm. longis; pappo maturo 2–2.5 mm. longo; achaeniis 1.4 mm. longis. —Prince George County, Virginia: dry woods and clearings south of New Bohemia, June 7, 1946, *Fernald & Moore*, no. 15,155 (type in Herb. Gray.; isotype in Herb. Phil. Acad.), Sept. 9, 1946, (ripe fruit), *Fernald, Long & Clement*, no. 15,373.

Clearly an extreme of the wide-ranging northern, inland and upland *Solidago juncea*, var. *neobohemica* stands apart as a Coastal Plain variety. Smaller in most parts than the great bulk of *S. juncea*, its measurements mostly touch those of the smaller-headed and -flowered inland and northern plant, but its phyllaries are strikingly dark green along the midrib, those of true *S. juncea* paler and more stramineous. The leaves of the basal rosette are relatively narrow, as are the lower cauline leaves, but the combination of capitular characters combined with the vividly green phyllaries, are most important. Measurements of heads in flower and in fruit from well developed *S. juncea* and several heads in both flower and fruit of var. *neobohemica* give the following results, these checked for me by Dr. Robert C. Foster:

S. juncea: involucre 3.5–4.5 mm. high, phyllaries pale green or stramineous on back; ligules 4–5 mm. long; disk-corollas 3.2–3.8 mm. long; pappus (incl. longest bristles) 2.6–3.3 mm. long; achenes 1.5–1.7 mm. long.

Var. neobohemica: involucre 3–4 mm. high; phyllaries vividly green along midrib; ligules 3.5–3.8 mm. long; disk-corollas 3–3.4 mm. long; pappus 2–2.5 mm. long; achenes 1.4 mm. long.

Solidago juncea in the Maritime Provinces, Quebec and New England has a flowering period (with youngest heads still unexpanded) from earliest July to early September; in New Jersey and Pennsylvania similarly from late June into early September (Stone, Pl. S. N. J. says "Mid-July to early September"); on the Piedmont and upland of Virginia, West Virginia and North Carolina (as shown by a meagre representation) from June 27 to August 22. Near New Bohemia, on the Coastal Plain of southeastern Virginia, var. *neobohemica* was well flowering on June 7. Its season of bloom must have begun in late May. See p. 93.

S. nemoralis Ait., var. Haleana Fern. To the only recorded stations northeast of Georgia (in Northampton County) add one in Nansemond County: sphagnous and peaty bog by Norfolk

and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,374. See p. 98.

*S. FISTULOSA Mill., forma **epilis,** f. nov., caule glabro; foliis glabris vel glabratis.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,372 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); sphagnous savanna-like swale east of Cherry Grove, south of South Quay, August 21, 1939, *Fernald & Long*, no. 11,177, and October 15, 1939, no. 11,627.

Typical *Solidago fistulosa* (*S. pilosa* Walt., *S. villosa* Ell.) usually has the internodes (especially the median and upper ones) densely pilose to villous and the lower surfaces of the leaves somewhat so. The three numbers from bogs of Nansemond County are glabrous. See p. 98.

*× S. HIRTIPES Fern. in RHODORA, xlviii. 65, pl. 1011 (1946). SUSSEX COUNTY: roadside thicket about 1½ miles north of Waverly, *Fernald & Long*, no. 15,015.

A very handsome and tall plant, presumably a hybrid of *Solidago graminifolia* (L.) Salisb., var. *Nuttallii* (Greene) Fernald and *S. microcephala* (Greene) Bush. A large and uniform colony. See p. 89.

ASTER SPECTABILIS Ait., var. SUFFULTUS Fernald. An additional station in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,375, plants smaller than those of dry habitats.

ERIGERON PHILADELPHICUS L., var. **scaturicola** (Fernald), stat. nov., *E. scaturicola* Fernald in RHODORA, xliii. 654, pl. 695, figs. 1 and 2 (1941).

Further experience indicates that the local *Erigeron scaturicola* is better treated as a variety of the wide-ranging *E. philadelphicus*.

BACCHARIS GLOMERULIFLORA PRESUMABLY NOT VIRGINIAN.—*Baccharis glomeruliflora* Pers. was based by Persoon on *B. sessiliflora* Michx., not Vahl, Michaux having found it "in sylvis maritimis Carolinae". Very soon thereafter Pursh cited it as growing "on the coast of Virginia and Carolina". Thereafter it appeared pretty regularly as Virginian, until in the Synoptical Flora Gray cut off Virginia from the stated range. Subsequently its occurrence in the state has been doubted, and, certainly close watching near the coast, southward to Knott's Island and nearly

to False Cape, has revealed only the ubiquitous *B. halimifolia.* Judging from the Gray Herbarium *B. glomeruliflora,* a very distinct species, is rare north of Florida. Aside from the abundant material from that state there are only two sheets from the southeastern states; one from Bluffton in the extreme southeastern corner of South Carolina (*Mellichamp* in 1878); the other from Wilmington (*M. A. Curtis*) in the southeastern corner of North Carolina. We may safely stop straining to see *B. glomeruliflora* in Virginia; probably Pursh did not see it.

*Helianthus angustifolius L., var. **planifolius,** var. nov. (tab. 1083), var. typica recedit caule simplici vel subsimplici 4.5–6 dm. alto; foliis imis mediisque oppositis vel suboppositis planis oblongis vel oblongo-lanceolatis obtusis vel subacutis 3–8.5 cm. longis 6–18 cm. latis, jugis remotis, foliis superioris alternis vel suboppositis.—Southeastern Virginia and apparently north to New Jersey, with typical *H. angustifolius* or by itself. Virginia: *Sphagnum-Magnolia* swamp 2 miles west of Williamsburg, Sept. 27, 1921, *Grimes,* no. 4474, sent for identification and tentatively called *H. Schweinitzii* T. & G.; sandy pine and oak woods south of Stony Creek, Sept. 21, 1939, *Fernald & Long,* nos. 11,470 and 11,471 (type in Herb. Gray.). A specimen from shrubby swamp, with *H. angustifolius,* Lakewood, New Jersey, Sept. 15, 1897, *E. H. Eames,* specimen sent to Gray Herbarium as not good *H. angustifolius,* is placed with var. *planifolius,* although with mostly alternate leaves.

In its blunt leaves and its very slender and low stem var. *planifolius* stands off pretty sharply from typical *Helianthus angustifolius.* The type (plate 1084, fig. 1) of the latter, from eastern Virginia (*Clayton*), belongs to the usual form of the species, commonly tall (up to 1.7 m. high), with often short fascicles in the leaf-axils, the abundant hard and scabrous leaves narrowly lanceolate to linear and long-attenuate, commonly with recurved margins. In its relatively short and blunt leaves *H. angustifolius,* var. *planifolius* simulates *H. floridanus* Gray. Many diverse plants have been sent out as *H. floridanus* and the type, *Palmer,* no. 283 (our plate 1085, figs. 1 and 2), is a mere broken-off top. So far as it shows, however, it has the phyllaries blunter than the caudate-attenuate ones of *H. angustifolius* and its leaves are usually less attenuate to quite blunt. It is matched or strongly approached by a large series of specimens, either broad- or narrow-leaved, found from Florida to Arkansas and

Texas and north to the Carolinas, in which the disk may be either yellow on expanding or brown. Whenever the roots have been well collected they show a slender rhizome, with elongate stolons: such specimens from Florida as *Curtiss*, no. 1437 (PLATE 1085, FIG. 3), on a sheet bearing Gray's validation, *Curtiss*, no. 6727, *Fredholm*, nos. 6084 and 6055, *Small, De Winkeler and Mosier*, no. 11,096; or from Alabama as *Blanton*, no. 7080; from Arkansas as *Demaree*, no. 8794; or from Texas as *Cory*, no. 19,811 and *Parks*, no. 41,008 (this erroneously distributed as the quite different *H. heterophyllus* Nutt.). These specimens, largely identified as *H. angustifolius*, have a very different root-system from true *H. angustifolius*, as typified by the Clayton specimen. The latter species has a knotty, short crown without stolons and in autumn develops crown-buds. Its bases, rarely collected, since it is easier not to do so, are well shown in a few numbered specimens: *Muenscher & Curtis*, no. 6621 from Long Island; *Benner*, no. 479, *Fogg*, no. 9920, *Long*, no. 19,462 from New Jersey; *Allard*, no. 5626 and *Fernald & Long*, nos. 6904 (our PLATE 1084, FIG. 2) and 11,469 from Virginia. Whether *H. floridanus* should be merged as a variety with *H. angustifolius* I do not know. Its root-habit and phyllaries seem to indicate a true species—as species go in *Helianthus*.

*H. ATRORUBENS L., var. ALSODES Fernald in RHODORA, xliii. 74, pl. 1020 (1946). Specimens cited from James City, Princess Anne (TYPE), Sussex and Bedford Counties.

H. MOLLIS Lam., var. CORDATUS S. Wats.

The plants of eastern Virginia previously reported as *H. mollis* belong to var. *cordatus*, with the principal leaves deeply cordate and clasping, typical (mostly inland) *H. mollis* having them with rounded to barely subcordate bases.

*H. DIVARICATUS L., var. ANGUSTIFOLIUS Ktze. JAMES CITY COUNTY: dry open ground about 3 miles north of Williamsburg, *Menzel*, no. 122.

Var. *angustifolius*, found chiefly on the Coastal Plain from Florida to Cape Cod, has narrowly lanceolate leaves (at 7–12 nodes below the solitary head or crowded infloresecence), these caudate-attenuate, the larger ones only 0.6–2 cm. broad and 5–10 cm. long.

*H. tracheliifolius Mill. Sussex County: sandy wooded terrace of Nottoway River, 3 miles north-northwest of Bethel Church, *Fernald, Long & Clement*, no. 15,381.

Balduina[1] uniflora Nutt. Gen. ii. 175 (1818), a distinguished and very definite plant with upright small-leaved stems terminated by a large golden-yellow head, therefore not easily overlooked, was described by Nuttall as found "In open grassy swamps from the maritime parts of Virginia to Florida" but its occurrence in Virginia is extremely doubtful. In the Synoptical Flora Gray said under the needlessly substituted *Baldwinia uniflora*, "Low pine barrens, S. Carolina to Florida and Louisiana" and in 1898 Britton & Brown, calling it by a later generic name, *Actinospermum*, said "Virginia (according to Torrey and Gray)" etc. Had they looked up Nuttall's original account they would have discovered that Torrey & Gray merely accepted Nuttall's statement. In the 7th edition of Gray's Manual the doubt was indicated by "Va. (?)". In the Gray Herbarium the northernmost stations represented are in Onslow, Duplin and Sampson Counties, North Carolina, at least 110 miles south of the "maritime parts of Virginia". In North Carolina, as indicated by the labels, it occurs on savannas and peaty pinelands, flowering through August and September. Nuttall was not often guilty of inaccuracy; his statement is a challenge.

Explanation of Plates 1056–1085

Plate 1056, Sagittaria planipes Fernald (figs. 1–6) and S. latifolia Willd., var. obtusa (Muhl.) Wiegand (figs. 7 and 8). S. planipes, all figs. from type: fig. 1, plant, × ½; fig. 2, bract, × 10; fig. 3, broad side, and fig. 4, narrow side of pedicel, × 10; fig. 5, anthers, × 10; fig. 6, achene, × 10. S. latifolia, var. obtusa: fig. 7, bract, × 10, from Medford, Massachusetts, August, 1865, *Wm. Boott:* fig. 8, anthers, × 10, from Concord, Massachusetts, July 25, 1893, *W. Deane*.

Plate 1057, Paspalum setaceum Michx., var. calvescens Fernald, all figs. from type: sufficiently explained in caption of plate.

Plate 1058, Paspalum setaceum Michx. and var. longepedunculatum (Le Conte) Wood. P. setaceum, all figs. from dry sandy pine-barrens south of Zuni, Isle of Wight Co., Virginia, *Fernald, Griscom & Long*, no. 6465: fig. 1, lower, and fig. 2, upper leaf-surface, × 10; fig. 3, spikelets, × 10. Var. longepedunculatum: fig. 4, base of plant, × 1, from Eustis, Lake Co., Florida, *Nash*, no. 1417.

Plate 1059, Panicum glutinoscabrum Fernald, all figs. from type: sufficiently explained in caption of plate.

[1] In spite of his ultra-English spelling of Baldwin, Nuttall's dedication of the genus *Balduina* was a model: "Dedicated as a just tribute of respect for the talents and industry of William Baldwyn, M.D., late of Savannah in Georgia; a gentleman whose botanical zeal and knowledge has rarely been excelled in America".

Plate 1060, Rhynchospora perplexa Britton, figs. 1–4, and var. virginiana Fernald, figs. 5–8. R. perplexa: fig. 1, terminal corymb, × 1.8, from an isotype, Florida, *Chapman;* fig. 2, achene, × 10, from same plant; fig. 3, achenes, × 10, from Ponce de Leon, Florida, *Curtiss*, no. 6482; fig. 4, achenes, × 10, from Mobile, Alabama, May, 1845, *Sullivant.* Var. virginiana: fig. 5, terminal corymb, × 1.8, from type; fig. 6, achenes, × 10, from type; fig. 7, achenes, × 10, from south of Mercy Seat Church, Surry Co., Virginia, *Fernald & Long*, no. 8989; fig. 8, achenes, × 10, from Airfield Millpond, southwest of Wakefield, Virginia, *Fernald & Long*, no. 14,298.

Plates 1061–1063, Nymphaea odorata Ait., var. stenopetala Fernald, all figs. from type. Plate 1061, a colony in pool in the Great Dismal Swamp, Virginia, showing the flowers raised above the leaves, the author at the margin of the pool, × 1/15, after small kodachrome by *H. E. Moore*, this labeled "Water-nymphs in the G. D. Swamp". Plate 1062, fig. 1, lower surface of leaf, × 1; fig. 2, base of flower, showing reflexed sepals, × 1. Plate 1063, fig. 1, dorsal, and fig. 2, ventral view of flower, × 1.

Plates 1064–1066, Rubus hypolasius Fernald, all figs., from the type. Sufficient explanation in the captions.

Plates 1067–1069, Rubus subinnoxius Fernald, all figs. from the type. Sufficiently explained in the captions.

Plates 1070 and 1071, Rubus uliginosus Fernald, all figs. from type. Sufficiently explained in the captions.

Plates 1072–1074, Rubus cupressorum Fernald, all figs. from type. Sufficiently explained in the captions.

Plate 1075, Crotalaria Purshii DC. (fig. 1) and var. bracteolifera Fernald (figs. 2 and 3), all figs. × 1. C. Purshii: fig. 1, two portions from summit of plant, from general type-area, border of dry sandy woods near Carson, Dinwiddie Co., Virginia, *Fernald, Long & Smart*, no. 5805. Var. bracteolifera: figs. 2 and 3, portions of summit of type.

Plate 1076, Hypericum canadense L., var. galiiforme Fernald, both figs. from type: sufficiently explained in caption of plate.

Plate 1077, Lyonia ligustrina (L.) DC., forma nanella Fernald, figs. × 1, from type. Sufficiently explained in caption.

Plate 1078, Gentiana Catesbaei Walt. (figs. 1 and 2) and var. nummulariaefolia Fernald (figs. 3 and 4). G. Catesbaei, both figs. 1 and 2 from Walter's type, courtesy of Dr. J. Ramsbottom. Var. nummulariaefolia, figs. 3 and 4, the type, × 1.

Plate 1079, inflorescences of Gentiana Catesbaei Walt., both × 1: fig. 1 from wet pine woods east of Eastville, Northampton Co., Virginia, *Fernald & Long*, no. 5414; fig. 2 from upper border of sandy and peaty shore of Darden's Pond, north of Courtland, Virginia, *Fernald & Long*, no. 15,343.

Plate 1080, Physalis heterophylla Nees, var. clavipes Fern., all figs. from type. Sufficiently explained in caption of plate.

Plate 1081, Physalis heterophylla Nees (figs. 1–3) and var. clavipes Fernald (figs. 4 and 5). P. heterophylla: fig. 1, base of plant and leaf at upper right, × 1, from sandy soil, Alstead, New Hampshire, *Fernald*, no. 315; fig. 2, pubescence of stem, × 10, from no. 315; fig. 3, leaf, × 1, illuminated from below, from Foxcroft, Maine, August 31, 1897, *Fernald.* Var. clavipes, both figs. from type: fig. 4, leaf, × 1, illuminated from below; fig. 5, enlarged and subligneous base of stem, × 1.

Plate 1082, Physalis heterophylla, var. ambigua (Gray) Rydberg (figs. 1–3) and var. nyctaginea (Dunal) Rydberg (figs. 4–6). Var. ambigua: fig. 1, portion of horizontal rhizome and base of erect stem, × 1, from Wallingford, Vermont, August 3, 1907, *G. G. Kennedy;* fig. 2, pubescence of stem, × 10, from Suffield Township, Portage Co., Ohio, *Webb, Rood et al.*, no. 1547; fig. 3, leaf, × 1, illuminated from below, from Norwich, Vermont, July 15, 1910, *E. F. Williams*, Var. nyctaginea: fig. 4, base of plant, × 1, from sandy old clearing near Nottoway River, north of Smith's Ferry, Southampton Co.,

Virginia, *Fernald & Long*, no. 8841; fig. 5, pubescence of stem, × 10, from dry woods near Middletown, Frederick Co., Virginia, *Hunnewell*, no. 14,019; fig. 6, leaf × 1, illuminated from below, from no. 8841.

Plate 1083, Helianthus angustifolius L., var. planifolius Fernald, all figs. from type. Sufficiently explained in caption of plate.

Plate 1084, Helianthus angustifolius L.: fig. 1, type, × ca. ¼, courtesy of Dr. J. Ramsbottom; fig. 2, ascending caudex and erect basal sprouts, × 1, from pineland northwest of Waverly, Virginia, *Fernald & Long*, no. 6904.

Plate 1085, Helianthus floridanus Gray, all figs. × 1: figs. 1 and 2, portions of type; fig. 3, characteristic stoloniferous base, from Duval County, Florida, *A. H. Curtiss*, no. 1437.

THE INADEQUATE BASIS OF THE NAME CARYA PECAN

M. L. Fernald

Of recent years the Pecan, long and correctly called *Carya illinoensis* (Wang.) K. Koch, has taken on the alluring and quite obvious specific epithet *Pecan*. Under this seemingly appropriate epithet it was published as *Hicoria Pecan* (Marsh.) Britton in Bull. Torr. Bot. Cl. xv. 282 (1888), this specific name promptly accepted by Dippel, Koehne, Coulter, Sargent, Rehder and others, although Sargent in 1889 preferred *Hicorius Pecan* (Marsh.) Sargent in Gard. & For. ii. 460 (1889). Under *Carya* it is *C. Pecan* (Marsh.) Engler & Graebn. in Notizblatt, Append. ix. 19 (1902).

That the name *Juglans Pecan* Marsh. Arb. Am. 69 (1785) antedates *J. illinoensis* Wangenheim, Nordam. Holz., 54, t. xviii, fig. xliii or xxxxiii (1787) there is no doubt, but Wangenheim gave a detailed description and a plate showing a characteristic leaf of "The Illinois Walnut Tree"; he had not got hold of the native name "Pecan"; but Marshal had picked up "Pecan" and not much else. Here was Marshall's account:

> 8. Juglans pecan. *The Pecan, or Illinois Hickery.*
>
> This tree is said to grow plenty in the neighbourhood of the Illinois river, and other parts to the westward. The young plants raised from these nuts, much resemble our young Pig-nut Hickerys. The nuts are small and thin shelled.

That is all. The only really descriptive phrase is the last one: "nuts . . . small and thin shelled", with nothing about their distinctive shape, color, 2-locular base and sweet kernel; nor of the winged sutures of the exocarp, nor of the many falcate-

recurving leaflets, etc., etc. This is in marked contrast with the really fairly clear descriptions of all the other "Hickerys" of Marshall, as, for instance, his

> 5. Juglans alba minima. *White, or Pig-nut Hickery.*
>
> This generally grows pretty large, sometimes to the height of eighty feet or more, and above two feet in diameter. The bark of young trees is smooth, but when older becomes rough and furrowed. The leaves are generally composed of five pair of lobes and an odd one, which are mostly narrower than those of many other kinds. The fruit is small and roundish, and covered with a very thin husk or covering, opening in divisions. The shell of the nut is also very thin, and easily cracked with the teeth; the kernel plump and full but very bitter. The timber of this is not much esteemed.

This, obviously, is a reasonably good account of *Carya cordiformis* (Wang.) K. Koch. The distinctive characters for his *Juglans Pecan* given by Marshall were: (1) "The young plants . . . resemble those of our young Pig-nut Hickerys"; (2) "The nuts are small and thin shelled", whereas his Pig-nut Hickery was described as having "fruit . . . small . . ., shell of the nut . . . very thin". The differences are not convincingly stated. Sargent, Man. ed. 2, also describes the nut of *C. cordiformis* as "with a thin brittle shell"; that of *C. ovata* "with a usually thin shell, . . . seed . . . sweet", its var. *ellipsoidalis* (from New York to Missouri) "with ellipsoidal . . . nuts abruptly long-pointed at apex" (the nut of the Pecan described as "ovoid to ellipsoidal" with "pointed apex").

Marshall, quite clearly, did not give any really distinctive characters for his *Juglans Pecan.* The only really distinctive point he had was the colloquial name; the other points mentioned by him are also characteristic of a number of Hickories of Illinois, "and other parts to the westward". Unless we treat colloquial names as diagnoses the Marshall account is too inadequate (*nomen subnudum*) for acceptance as a distinctive description. Wangenheim's *Juglans illinoensis* was well described and illustrated, even to the elongate fruit, for, although he had and illustrated from material cultivated on Long Island curved ("fructu reniforme") fruit, it is probable that he had material in which the fruit was not well filled. If we are to accept only names of indubitable application *Carya Pecan* should be discarded in favor of C. illinoensis (Wang.) K. Koch.

The reasoning, that Marshall's use of the word *Pecan* with the statement that the tree, which he knew only in cultivation, resembled his Pig-nut, and, like it, had the shell of the nut thin, was enough to satisfy Britton and his followers. Recently Britton's former student, Gleason, has been pronouncing that when an author flatly stated that his new species was not an earlier described one of another author, he really meant that it was! Thus, *Lathyrus maritimus* Bigel. Fl. Bost. ed. 2: 268 (1824) was clearly described from material growing on beaches at Dorchester and Chelsea, Massachusetts. Bigelow naturally thought that his plant was what Pursh had really intended by *Pisum maritimum*, Bigelow giving the "*Syn.* PISUM MARITIMUM *Pursh?*". We should now say *sensu* Pursh, not L., for Pursh had literally copied from Willdenow a brief diagnosis of a European plant and had cited two European plates which, in details, can not be matched by the Dorchester and Chelsea plant. Then, in explanation, Bigelow said:

> "This plant, which has very much the habit and aspect of a pea, is only found on the borders of the beach and salt marsh, whence it has been often taken for the *Pisum maritimum* of Europe. It is, however, decidedly a Lathyrus."

Therefore by Bronxian philosophy we get Gleason's conclusion:

> "I shall maintain the well known and long established name *Lathyrus maritimus* (L.) Bigel."[1]

[1] Gleason in Phytologia, ii. 212 (1947).

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Photo. John W. Moore

SEDUM ROSEA, var. LEEDYI, type, × ⅖.

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Vol. 49. August, 1947. No. 584.

A NEW VARIETY OF SEDUM ROSEA FROM SOUTH-EASTERN MINNESOTA AND ADDITIONAL NOTES ON THE FLORA OF THE REGION[1, 2]

C. O. Rosendahl and J. W. Moore

(Plate 1086)

1. A New Variety of Sedum Rosea (L.) Scop.*

In September of 1936 John L. Leedy, then a student of the University of Minnesota, discovered a *Sedum* growing on the north face of limestone cliffs along the north fork of the Root River about three miles south of Simpson, Olmsted County, Minnesota. The material brought in was not sufficient for a specific determination and it was suspected at the time that the plants might represent strays from cultivation. Additional specimens from the same locality were collected by Mr. Leedy in July of 1938 and again in July of 1942. In September of 1942 John W. Moore in company with Mr. Leedy and E. P. Thatcher secured staminate and pistillate plants. A study of these collections has proven them to be *Sedum Rosea* (L.) Scop. The plants are polygamodioecious with only a few perfect flowers. Their habit is sufficiently different from the typical form and all the described American varieties to warrant describing the entity as a new variety.

[1] Contributions from the Herbarium of the University of Minnesota IV.

[2] The field work was supported in part by grants in aid of research from the Graduate School of the University of Minnesota.

* The orthography of Sedum Rosea has been discussed by M. L. Fernald in Rhodora 49; 79-81, 1947.

Sedum Rosea (L.) Scop. var. **Leedyi** varietas nova[3] (Plate 1086) A varietate typica differt; caules altiores, usque ad 45 cm. alti; folia plura, in caule usque ad 90, pro rata longiora angustioraque, longiora quam sunt lata circiter sexiens et dimidia parte, aut plerumque integra aut paucis dentibus remotis et extensis et exstantibus supra medium instructa; flores staminiferi petalis purpurellis pistilliferi petalis viridibus et eodem tempore flavis instructi; fructus pedicellis longioribus gracilioribusque instructus.—The type collection consists of staminate plants and pistillate plants each with a few perfect flowers. From northeast-facing limestone cliffs, north branch of the Root River opposite the Herman McDaniel farm about 3 miles south of Simpson, Minnesota, July 12, 1942, *John L. Leedy* (Herb. Minn.). Additional specimens from the same locality are: July 23, 1938, *Leedy;* and September 24, 1942, *Moore, Leedy, and Thatcher,* No. 15691.

In the species as well as all of the hitherto described American varieties the leaves are obovate, less numerous per stem, mostly up to 3½ times longer than broad, entire or more often with few to several low teeth. In the new variety the leaves are narrowly oblanceolate, averaging 6½ times longer than broad, mostly entire or with a few prominent, porrect, irregularly spaced teeth above the middle.

2. Jeffersonia and Some Other Local Plants of Southeastern Minnesota

A recent find which marks a very considerable northwestward extension of range of a typical alleghenian species is the occurrence of *Jeffersonia diphylla* (L.) Pers. in the upper gorge of the White Water River in Winona County. The station is about thirty miles northeast from where the *Sedum* occurs. This discovery, too, is credited to one of our botany students, Mr. Arnold Schultz. On the sixteenth of June, 1942, in company with the late F. K. Butters and Mr. Schultz the writers visited the place and found *Jeffersonia* growing in abundance on the steep talus slope of towering dolomite cliffs. The plants were past the blossoming stage but ample fruiting specimens were collected and prepared for herbarium record.[4]

[3] The variety is named for John L. Leedy.

[4] Upper gorge of the White Water River, St. Charles Township, SE¼ Sect. 1, Winona County, Minnesota, June 16, 1942, *Rosendahl, Butters, Moore, and Schultz,* No. 7538.

Other plants of local occurrence in southeastern Minnesota associated with *Jeffersonia* were: CYSTOPTERIS FRAGILIS (L.) Bernh. var. PROTRUSA Weatherby, No. 7530; MILIUM EFFUSUM L., No. 7556; ZIGADENUS GLAUCUS Nutt., No. 7537; VIOLA ERIOCARPA Schwein., No. 7555; HYDRASTIS CANADENSIS L., No. 7551. In Minnesota *Hydrastis* is now known to grow only in Winona County. Although it was reported from Stearns County by Upham[5], we have seen no specimens to substantiate this report. The only other collections of *Hydrastis* in the University of Minnesota Herbarium are those of J. M. Holzinger made in Winona County in May 1899, and his Bear Creek, Winona County specimens collected in May 1901.

On a subsequent collecting trip to the same station ASTER SHORTII Lindl. ex Hooker was collected in the proximity of the *Jeffersonia* patch, Oct. 4, 1946, *Moore and Huff*, No. 19343. It was found to be locally abundant. I. A. Lapham lists *Aster Shortii* without locality[6] and Warren Upham[7] reports it from the "Southeast" part of the state and cites Lapham. Extant specimens in the University of Minnesota Herbarium are three sheets collected at Lanesboro, Fillmore County, by J. H. Hvoslef, and a specimen collected on a wooded slope of a valley 3–4 miles north of Choice, also in Fillmore County, August 14, 1927, *Rosendahl*, No. 5368.

On a west-facing slope near where *Jeffersonia* was found POA SYLVESTRIS A. Gray was encountered along a "wood road" (No. 7529). At present this is the only known station for the grass in Minnesota, but it may prove to be less scarce in the southeastern part of the state than indicated, for it had previously been collected in Winneshiek County, Iowa, near the Iowa-Minnesota state line, June 24, 1915, *Rosendahl*, No. 3055. Farther down the above mentioned slope CAREX CEPHALOIDEA Dewey grew in moist soil along the roadside, No. 7543. The

[5] Upham, Warren, Catalogue of the Flora of Minnesota, the Geological and Natural History Survey of Minnesota, Part VI of the Annual Report of Progress for the Year 1883, p. 20, 1884.

[6] Lapham, I. A., A Catalogue of the Plants of Minnesota. Report of the State Horticultural Society for 1875, p. 101. Professor N. C. Fassett has informed us that he has not been able to locate any Lapham specimens of *Aster Shortii* from Minnesota in the University of Wisconsin Herbarium.

[7] Upham, Warren, Catalogue of the Flora of Minnesota, The Geological and Natural History Survey of Minnesota, Part VI of the Annual Report of Progress for the Year 1883, p. 71, 1884.

species is evidently of very rare and local occurrence in the state for it is represented by only one other collection, namely that of *Rosendahl and Butters* No. 3246, June 14, 1916, from boggy bottomlands five miles east of Mankato[8].

Despite a good deal of careful collecting in southeastern Minnesota covering a period of nearly fifty years the following species are known mostly from only one or rarely from two or three closely contiguous stations.

Botrychium dissectum Spreng. was collected in Nerstrand Woods, a hardwood forest in Rice County, SE¼, Sect. 9, Wheeling Township, October 5, 1930, *Rosendahl*, No. 6398. In 1931 this specimen was reported upon by E. W. Graves[9], but the locality there given is not too exact. This is the typical form of the species, and is not known to occur in any other locality in Minnesota. The plant is of very rare occurrence west of the Mississippi River. Only five localities were given by Mr. Graves west of that river throughout its entire course.

Pellaea atropurpurea (L.) Link is known to grow at one station, Jefferson, Houston County, August 3, 1899, *H. L. Lyon*, where it was collected a second time on August 20, 1936, *Rosendahl and Butters*, No. 6700.

Echinochloa Walteri (Pursh) Nash[10]. This Cockspur Grass is represented by a single collection from a quaking bog on the Mississippi River bottoms, Weaver, Wabasha County, August 28, 1926, *Fassett and Hotchkiss*, No. 2906. N. C. Fassett has cited this specimen in Rhodora, **32**: 58, 1930.

Melica nitens Nutt. ex Piper is known from two stations along the Root River. In 1902 it was discovered 3–4 miles northeast of Whalen, Sect. 2, Holt Township, Fillmore County, *Rosendahl*, No. 592[11] and a mile or so down stream at a point three miles west of Rushford in sandy soil of wooded roadside, Fillmore County, June 21, 1915, *Rosendahl and Butters*, No. 2995. The specimens in question are typical *Melica nitens* Nutt. ex Piper.

[8] An earlier report by the senior author of the occurrence of *Carex cephaloidea* in southeastern Minnesota has proved to be incorrect. It was based on his collections No. 433 and 457 from Spring Grove, Houston County, both of which are *Carex gravida* Bailey.

[9] Graves, E. W., *Botrychium dissectum* from Minnesota, American Fern Journal, **21**: 21–24, January–March, 1931.

[10] This species was first reported by W. A. Wheeler, Minnesota Botanical Studies, **3**: 84–85, 1903. However, it seems apparent that the specimens there listed were the long-bearded variety of *Echinochloa Crus-galli* (L.) Beauv. This also applies to John B. Moyle's report in Rhodora, **40**: 275, 1938. The plants cited in his article all belong to *Echinochloa Crus-galli* (L.) Beauv. var. *longiseta* (Trin.) Hara. At present *Echinochloa Walteri* is known only from Weaver.

[11] This collection was reported in 1903 as *Melica diffusa* Pursh, Rosendahl, C. O., Minnesota Botanical Studies, **3**: 261, July 3, 1903.

Leersia lenticularis Michx. has been collected at three stations: Jefferson, Houston County, August 17, 1900 by *H. L. Lyon;* in wet woods near West Newton, Weaver, Wabasha Co., Aug. 23, 1926, *Fassett and Hotchkiss,* No. 3060 (Herb. Gray)[12]; and Winona, *J. M. Holzinger,* No. 33, without definite date, (Herb. Gray).

Poa Wolfii Scribn. is known from a single collection from a woods on a sandy hillside near Spring Grove, Houston County, June 3, 1902, *Rosendahl,* No. 285.

Carex Crus-corvi Shuttlw. comes from two stations: one collection is from Red Wing, Goodhue County, August 1885, *Sandberg;* and one from a shady swale, near foot of West Newton slough, Weaver, Wabasha County, August 23, 1926, *Fassett and Hotchkiss,* No. 3087 (Herb. Gray).

Carex laevivaginata (Kükenth.) Mackenzie is from a creek-bed in moist soil near Spring Grove, Houston County, June 10, 1902, *Rosendahl,* No. 456.

Corallorhiza odontorhiza Nutt, has been collected but once in Minnesota, in white oak, red oak, shellbark hickory forest, Sect. 22, Spring Grove Township, Houston County, August 1899, *Rosendahl,* No. 1158. This collection was examined by Mr. A. M. Fuller who established its identity. The occurrence of this late-flowering coral-root in Minnesota was first noted by him in the Orchids of Wisconsin[13].

Paronychia canadensis (L.) Wood, a plant previously known as *Anychia canadensis* (L.) B. S. P., was first reported from Minnesota by I. A. Lapham under the name *Anychia dichotoma* Michx. as early as 1875[14]. J. M. Holzinger collected it on Trempealeau Mountain in Wisconsin, a high island in the Mississippi River below Winona, August, 1897. Two years later the plant was collected near Spring Grove, Houston County, August 25, 1899, *Rosendahl,* No. 1160, and again at the same station, July 30, 1909, No. 2322, August 3, 1919, No. 3846, and June 27, 1920, *Rosendahl and Butters,* No. 3929. Aside from this locality no specimens have been seen from elsewhere in Minnesota.

Rorippa sessiliflora (Nutt.) Hitchc. is known from two stations, Red Wing, Goodhue County, August 1884, *Sandberg,* and Winona, Winona County, August 1886, *Holzinger.*

[12] All collections cited in this paper are in the Herbarium of the University of Minnesota except those which are designated Herb. Gray which are in the Gray Herbarium, Harvard University, Cambridge, Massachusetts.

[13] Fuller, Albert M., Studies on the Flora of Wisconsin Part I: The Orchids; Orchidaceae, Bull. Pub. Mus. of the City of Milwaukee, 14: No. 1, Feb. 1933, p. 139, map 24, p. 141.

[14] Lapham, I. A., A Catalogue of the Plants of Minnesota. Report of the State Horticultural Society for 1875, p. 94. A check was made at the University of Wisconsin Herbarium by N. C. Fassett and no Lapham specimen of this plant from Minnesota seemed to be extant. The report may well have been based upon a field determination.

Saxifraga Forbesii Vasey has been found on wet sandstone ledges, northwest base of Gwinn's Bluff, Winona County. Presumably J. M. Holzinger's collection from a sandy wet spot of June 1886 was from the same locality. Collections are May 3, 1925, *Rosendahl*, No. 4789; July 2, 1920, *Rosendahl and Butters*, No. 3965, and the Holzinger specimen.

Asclepias purpurascens L. was collected twice at Lake City in 1883: Lake City, Wabasha County, July 18, 1883, *Sara Manning*, and Lake City, July 23, 1883, *W. H. Manning* (Herb. Gray).

Aureolaria grandiflora (Benth.) Pennell var. pulchra Pennell is represented by one collection from the Winnebago Valley, Houston County, August 12, 1899, *Wheeler*, No. 512.

Prenanthes crepidinea Michx. is known from only a single collection, Jefferson, Houston County, August 29, 1900, *Lyon*, No. 755.

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A Mexican Station for three Manual-range and South-eastern Plants.—Scirpus rubricosus Fern. (*S. Eriophorum* Michx.) and Tovara virginiana (L.) Raf. are represented in the Gray Herbarium by collections from Gray's Manual range and south to Florida and west to eastern Texas: the former in swamps, marshes and low woods to Dallas Co., Texas; the latter in rich woodlands and thickets to San Jacinto Co., Texas.

In early November, 1946, the writer had the opportunity of collecting about Lake Atexca near Molango in the state of Hidalgo, Mexico, where the two were discovered in close proximity: *Scirpus rubricosus* in shallow water of the marginal marsh (No. 2022), *Tovara virginiana* in moist thickets by the lakeside (No. 2024). This station, at about 1400 meters elevation, represents a southern extension into Mexico of approximately seven hundred miles for these species.

At another section of the bordering marsh, a third species of interest, Habenaria repens Nutt. (No. 1932), formed an extensive colony among cattails and water-hyacinths. This plant does not extend into the Manual range but is found in swamps, ponds and lake-shores from North Carolina south to Florida and west to eastern Texas in the United States. Known also from

Central America, the West Indies and South America, its presence in Mexico is now authenticated.

The *Habenaria* was determined by Dr. Donovan S. Correll. Numbers cited are those of the writer and specimens have been deposited at the Gray Herbarium.—H. E. Moore, Jr., Gray Herbarium.

THE NORTH AMERICAN VARIETY OF EQUISETUM TELMATEIA

M. L. Fernald

The name *Equisetum Telmateia* Ehrh. in Hannövers. Mag., 1783: 287 and Beitr. ii. 159 (1788), so long used in both Europe and America, has twice given way, at least temporarily, in recent European publications to earlier competitors. A majority of European taxonomists, Ascherson & Graebner, Hegi, Rouy, Britten & Rendle, Briquet and many others, have taken up, without expressing any doubt, the earlier *E. maximum* Lam. Fl. Franç. i. (7) (1778), although Milde, Mon. Equiset. 19 (1865), maintained that *E. maximum* was a mixture of *E. arvense* L. and *E. Telmateia.* Since *E. arvense* dated from 1753, the removal of that element (if it were there) left *E. maximum* for the large species which, to quote Lamarck, "s'élèvent à la hauteur de trois pieds". At the time these later authors were writing, that conclusion seemed justified and the name *E. maximum* the correct one for the species. But now the International Rules have undergone so many alterations that *E. maximum* has become invalidated! Unfortunately, Lamarck was giving a new name to a species which he thought to have an earlier binomial; for before his description he cited as identical with his *E. maximum* the "*Equisetum fluviatile.* Lin. Sp. 1517" (i. e. *E. fluviatile* L. Sp. Pl. ed. 1: 1062 (1753) and ed. 2: 1517 (1763), priority of publication then considered a secondary matter. Since Lamarck considered his new *E. maximum* the same as the earlier *E. fluviatile* his new name was illegitimate and by Art. 61 of the International Rules can not be accepted.

Another and still earlier name got temporarily into use for the Giant Horsetail, *Equisetum Telmateia.* This was *E. majus* Garsault, Traité des Plantes et Animaux, ii. 166, pl. 258 A (1767),

which was taken up and supported with seemingly sound logic by Thellung in his detailed article, *Nomenclator Garsaultianus* in Bull. Herb. Boiss. sér. 2, viii. no. 11: 778–793 (Oct. 31, 1908). In the next year Schinz & Thellung, in their searching study of the nomenclature of Swiss plants, in Vierteljahrs. Naturforsch. Gesellsch. Zürich, liii. 515 (1909), clearly showed its priority over both *E. maximum* (1778) and *E. Telmateia* (1783). But again a change in the International Rules now throws it out, for by Art. 68 (4) "Specific epithets are illegitimate . . . (4) When they were published in works in which the Linnaean system of binary nomenclature for species was not consistently employed". There is no question about the failure "consistently to employ" "the Linnaean system of binary nomenclature" in Garsault's work. This was definitely asserted by Britten & Rendle in Journ. Bot. xlvii. 322 (1909) in their criticism of Thellung's interpretation. Their concluding paragraph, however, makes one laugh: "It is absurd to attempt a parallel, as Dr. Thellung does, between the nomenclature of Miller's *Gardeners Dictionary*, ed. viii., and that of Garsault. In this edition Miller, as he says in his preface, entirely followed Linnaeus's method; his nomenclature is that of Linnaeus except for additions which also follow the binominal system".[1] It would seem probable that Britten & Rendle must sometime have seen Miller's ed. 8. The following quotation from

[1] To some minds Miller's statement in his Preface, that he was following the method of Linnaeus, does not necessarily mean that he said that he was consistently using binomials. Miller's emphasis was on the *system* of classification, as shown by his own words:

> "In the last edition [which was largely polynomial] of this work, the author adopted in a great measure the system of Linnaeus, which was the prevailing method of ranging plants then in use among botanists; but as many of the plants which were treated of in the Gardeners Dictionary, were not to be found in any of Linnaeus's works then published, Tournefort's system was also applied to take in such as were not fully known to Dr. Linnaeus; but since that time the learned professor having made great additions to his works, and those additions being generally consulted for the names of plants, the author has now applied Linnaeus's method entirely, except in such particulars, where the Doctor not having had an opportunity of seeing the plants growing, they are ranged by him in wrong classes; as for instance, the Ilex or agrifolium is ranged in his fourth class, with those plants whose flowers have four stamina or male organs, and four stigmas or female parts of generation; whereas those plants have male flowers upon some, and female upon other plants. The Laurus Linnaeus has placed in his ninth class, with those plants whose flowers have nine stamina or male organs of generation, and one female part; but these plants should also be ranged in his twenty-second class, for all the species of this genus have male and female flowers on different plants. These, with some other alterations from Linnaeus's system, have been made in this edition, where the author has given his reasons for so doing, which he hopes will be approved by the public."

Dr. E. D. Merrill's defense of the prevailingly binomial nomenclature of William Bartram clearly shows how futile it is to assert that "In this edition Miller . . . entirely followed Linnaeus's method": "About a week before I received the final proofs of this paper Professor M. L. Fernald called my attention to edition 8 of 'The Gardener's Dictionary' by Philip Miller (1768), the edition in which he changed his entries to the binomial system. He was distinctly inconsistent, for while most of the plant names are binomials, there are a considerable number of monomials and a distinctly large number of descriptive phrases. Thus in the entries under the letter A, with about 560 binomials, there are eighteen polynomials in the form of pre-Linnaean descriptive sentences. Examples are 'Alchemilla foliis lobatis sericeis acutis' (4 binomials under *Alchemilla*); 'Aloe foliis erectis subulatis radicatis undique inerme spinosis' (22 binomials under *Aloe*); and 'Asparagus caule herbaceo erecto, foliis setaceis . . .' (9 binomials under *Asparagus*). I merely cite this standard work, which all taxonomists accept as a source of both generic and specific names, as supporting my contention that Bartram's botanical names should be accepted. Certainly if Bartram's 'Travels' be eliminated, so logically should all the names in Miller's edition of 1768 be discarded, for he was more inconsistent than was Bartram. His intention was clear, in that he accepted the binomial system even if, in a certain percentage of cases he also included cumbersome pre-Linnaean descriptive sentences as the names for certain species that he recognized."[2] Garsault's book may with justification be rejected because, according to Thellung, the author obviously used uninomials (282), binomials (336) and polynomials (71), intending as Britten & Rendle say, "to use no system, binominal or otherwise".[3] So now, until the British force through another change in the International Rules

[2] Merrill in Bartonia, no. 23: 35 (1945).

[3] This whole problem of deciding what an early author really intended, when his practise was inconsistent, is a baffling one and liable to utterly conflicting interpretations. What to one student seems to be a work in which "the Linnean system of binary nomenclature for species was not consistently employed", to another sometimes seems just the reverse. Witness Sprague's argument in Journ. Bot. lxxvii. 343 et seq. (Dec. 1939), that Oeder's binomials, interspersed among many polynomials, in Flora Danica, vol. iii, are not invalidated, because most of his species had binomials; and my reply, with photographic reproductions from Oeder's pages, in RHODORA, xlii. 267–269 (1940). As I there state, Art. 68 (4) was one proposed by the British botanists "to remove various sources of ambiguity". So long as ambiguity and contradictory interpretations prevail we are not very near to clarity.

and give us their strictly legalistic interpretation of what they are supposed to mean, we may go back hopefully to the present survivor, *E. Telmateia* Ehrh.

As to the American representative of *Equisetum Telmateia*, the story is brief. In 1862 Milde described in great detail a small fragment, scarcely 4 inches long, of a sterile stem brought to Buchenau in Bremen by a traveller who had picked it near Sonoma, California, this being *E. Braunii* (the name of the collector being Pajeken) of Milde in Verhandl. Zool.-botan. Gesellsch. in Wien, 1862: 515, this later treated as *E. Telmateia*, var. *Braunii* (Milde) Milde, Mon. Equiset. 246, t. v, fig. 22 (1865). There is no need here to repeat in detail all the minute morphological and anatomical differences pointed out by Milde, the most obvious one emphasized by Luerssen, Farnpflanzen, 676—Rabenhorst, Krytogam.-Fl., ed. 2, iii. 676 (1889). Milde did not have the fertile stem, but merely a fragment of a sterile one. Perhaps the most striking departure of the North American plant (British Columbia to southern California; Keweenaw Peninsula, Michigan) is in the former. Taking the characters from Eurasian specimens and the detailed descriptions of Milde, Luerssen and other European specialists, and from North American specimens and the careful description by Abrams, we get the following contrasts.

Equisetum Telmateia. *Fertile stem:* 1.5–2.5 (rarely in green-branched forms –5) dm. high, 6–13 mm. thick; sheaths (except lowest), including teeth, 1.5–4 cm. long, all but the uppermost with 20–35 free slender teeth 5–10 mm. long, the uppermost with teeth free or but slightly united in pairs. *Sterile stem:* elongating to 0.5–1.2 (very rarely –2) m. high, with broadly convex smooth or smoothish ribs.

Var. Braunii. *Fertile stem* 2.5–6 dm. high, 1–2.5 cm. thick; sheaths 4–9.5 cm. long, with 20–30 lanceolate teeth united by 2's or 3's. *Sterile stem* becoming 0.5–3 m. high, with prominently angled ribs commonly scabrous with siliceous processes.

Other, chiefly anatomical, differences presumably exist, these to be worked out by specialists on the *Pteridophyta* (although Milde noted several), but enough superficial characters exist to demonstrate that *Equisetum Telmateia*, var. *Braunii* is not identical with the European plant, a fact clearly brought out by Milde eighty-five years ago. The occurrence of the plant of the Pacific Slope as an isolated colony on Keweenaw Peninsula (see C. K. Dodge in Fern. Bull. xx. 16 (1912), a specimen with more detailed local data in Gray Herb.) is highly significant in view of the oc-

currence there or elsewhere in its neighborhood of completely isolated plants not generally found east of the Continental Divide, such as *Ceanothus sanguineus* Pursh, *Vaccinium membranaceum* Dougl., *Adenocaulon bicolor* Hook. and many others discussed by me in Rhodora, xxxvii., nos. 438–441, their segregation shown in maps 6, 7, and 9 (1935).

Characteristic illustrations of the fertile stems of the two varieties of *Equisetum Telmateia* are the following. Of true European E. Telmateia: Milde, Mon. Equiset. t. v, fig. 28 (1865); Pratt, Grasses, Sedges & Ferns Gr. Brit. ed. 3. vi. t. 313 (1873); Syme, Engl. Bot. xii. t. 1888 (1886); Bergdolt in Hegi, Ill. Fl. Mittel-Eur. i. t. 9, fig. 2 (1908). Of the North American var. Braunii: Clute, Fern Allies, 59 (1905); Abrams, Ill. Fl. Pacific States, i. 32, fig. 2 (1921).

THE USE OF ALCOHOL IN PLANT COLLECTING

W. H. Hodge

Recently R. E. Schultes (Rhodora **49:** 54–60. 1947) has given us a valuable account of Paul Allen's method of preparing herbarium specimens with the aid of formaldehyde. Schultes points out that the method is useful in the wet tropics, expecially where rather limited collections are to be made and where transportation and drying problems are difficult. I should like to append to his article a brief description of another agent, alcohol, which is used in a fashion similar to formaldehyde, to which under certain conditions it may prove superior. Since Schultes has summarized the difficulties of a botanical collector in the wet tropics and the concomitant reasons for treating with formaldehyde, I will not repeat the same problems but suggest that the reader review the present article in conjunction with that of Schultes.

I owe the method here described to Augusto Weberbauer of Lima, an eminent student of the Peruvian flora. In a lifetime of extensive field collecting in some of the most difficult terrain in this hemisphere, Professor Weberbauer has found alcohol to be most useful in the preservation of all kinds of herbarium material. I can recommend it as well, for during two and a half years of wartime field work as a cinchona botanist in Peru, I used Weber-

bauer's method almost entirely. The great distances to be covered in that country, the lack of time for drying in the field, the limited number of mules or Indian carriers which placed a definite limit on the amount of field equipment carried, the war emergency that required a single botanist to do many tasks unrelated to his science—all these were ample arguments against dallying in the field with ordinary and bulky drying equipment. And because our field work was largely limited to a special group, the genus *Cinchona* and its close relatives, our plant collections were small.

As with formaldehyde, the principal value of alcohol is not in eliminating standard drying procedure but rather in preserving plants in good condition and for indefinite periods until they may be pressed and dried carefully in a location where drying facilities are available and subsequent safe storage may be effected. The advantages of alcohol over formaldehyde are principally three: 1) alcohol, in one form or another (rum, aguardiente, etc.) is nearly always available in out-of-the-way places; in general wherever you find man you find some kind of usable alcohol; for this reason there is seldom any need of carrying alcohol on a trip, at least not for any great distance; 2) alcohol—any crude local form will do—is relatively inexpensive, unlike formaldehyde which is a costly reagent throughout Latin America; 3) alcohol is not an irritant and does not have to have special handling. There are enough inconveniences in the field without having to worry about skin-cracking and possible infections resulting from such injuries.

Specimens treated with either formaldehyde or alcohol must be shipped in some kind of air-tight container which will not permit evaporation. Besides the alcohol and the usual supply of pressing paper, one needs a box of some kind. Schultes mentions the possibility of wrapping formaldehyde-dipped specimens in pliofilm. Presumably such a covering would work also with plants preserved with alcohol but care should be taken that such material be so wrapped that the pliofilm covering is well protected; a hole made in this wrapping during shipment and permitting evaporation of the alcohol would result in worthless specimens. In Peru I originally used light but strong plywood boxes into which fitted a removable metal box, made to the

internal dimensions of the former. The metal box with its removable cover could be sealed tightly by means of strips of one-inch-wide surgeon's tape which could be waxed over lightly, after sealing, by rubbing with an ordinary candle. The outer wooden box was merely a protective shell against the hard knocks of transit. The dimensions of a box of this type need not be standardized but in width and depth should be just equal to a standard folded newspaper (or a 12 x 18 inch collecting sheet). The length of the box may vary but is usually limited to the size demanded (24–30 inches) by the type of transportation agent—in Andean Peru a mule or an Indian's back. It must be remembered in mule transport that boxes should be in equal-sized and equal-weighted pairs to counteract the danger of shifting cargo on treacherous trails. Boxes of the type described were fitted with padlocks because they served our parties in a double capacity. Since they were more or less watertight and vermin-proof, they could be utilized to carry food and provisions until empty, whereupon they became available for the storage of specimens. Later in our work we had a local metal shop make up sturdier galvanized boxes of the same dimensions but without wooden covers. These functioned well although without the protection of the wooden cover it was more difficult to protect the taping against pulling or rubbing off in transit. In some parts of the Andes I have seen crude, heavy, and rainproof leather boxes used for cargo and these would make excellent protective covers for metal boxes.

Freshly collected specimens are placed in regulation-size folded newspaper stock on which is added the collection number and any other necessary data. I have found that the subsequent use of alcohol does not eliminate pencilled notations, but I have always preferred and have used heavy wax or other types of colored marking pencils. Once annotated or numbered, the specimens may be placed directly in the collecting box—no pressing of any kind is necessary. Alcohol is added at this time, and usually, as I have stated above, in the form of some kind of locally available native drink (a shocking thing to the Indian aides who can never understand such wasteful procedure!). The liquid is poured over the papers but only in a quantity sufficient thoroughly to moisten them. A little excess liquid in the

bottom of the tin box will do no harm. The metal cover of course should be immediately put in place after the alcohol is added in order to prevent loss from evaporation. Just as in a press, a collecting box of this type will hold as many specimens in their papers as can be squeezed tightly into it. When full the cover is sealed with the tape and then waxed, but before this is done one should be certain that all papers are reasonably moist with alcohol. Experience has shown that plants, if untampered with, are good for several months of perfect preservation in such a box once it has been sealed.

Boxes containing specimens temporarily preserved in this manner in a saturated atmosphere of alcohol, are light in weight and lend themselves to all methods of transport including shipment by air. Thus upon our arrival in a populated district after a long trip, it was our custom to air-express the containers to the museum of the University of San Marcos in Lima where aides would open the boxes, remove the plants, and prepare them for the herbarium, handling them during the drying process exactly as though they were fresh material. The empty boxes could be returned by air to the field party. Herbarium specimens made in this way appear to be just as satisfactory as specimens prepared by normal procedures, and in fact they are less brittle than those obtained from fresh material and dried immediately by artificial heat. Of course, and as with formaldehyde, all natural colors are lost, the specimens appearing brownish. For this reason it is imperative that the botanist record all such data at the time of collection in the field.

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TWO EASTERN AMERICAN SPECIES OF IRIS

M. L. Fernald

Iris Hookeri Penny, forma **pallidiflora** (Fern.), comb. nov. *I. setosa* Pallas, var. *canadensis* M. Foster, f. *pallidiflora* Fern. in Rhodora, xxviii. 168 (1926).

I. Hookeri, forma **zonalis** (Eames), comb. nov. *I. setosa*, var. *canadensis*, f. *zonalis* Eames in Rhodora, xi. 91 (1909).

The blue-flowered *Iris Hookeri*, so distinct in its dense habit, with strongly multicipital base with erect crowns, low stature,

petals reduced to awn-tipped rudiments only 1 or 2 cm. long, and papery beakless capsules, carpets the crests of sea-cliffs or bluffs, the turf back of or upper borders of sea-beaches and other dry or dryish maritime habitats from latitude 58° on the outer coast of Labrador south in an extremely narrow but interrupted belt, rarely 100 feet wide, on the coast to latitude 44°, midway on the coast of Maine, with an intrusion up the lower St. Lawrence to Charlevoix and Montmagny Counties, Quebec. In recent years it has been treated as an eastern variety of the Beringian *I. setosa* Pallas: *I. setosa*, var. *canadensis* M. Foster in RHODORA, v. 158 (1903). Prior to Sir Michael Foster's announcement that it is only a relatively low and isolated eastern variety of the taller species of northeastern Asia and Alaska, the eastern plant had regularly passed as *I. Hookeri* Penny (1832). After a period of more than 40 years, in which Sir Michael's interpretation has been generally accepted, I find myself unable to maintain *I. Hookeri* as merely a variety of *I. setosa.*

The latter is a relatively tall plant, with loosely branching crown, the many specimens before me showing the horizontal to oblique rhizomatous branches of the loose crown 4–10 cm. long and bearing fibrous remnants of decayed leaves; *I. Hookeri* being very densely cespitose, the closely crowded erect or ascending crowns retaining intact many marcescent and undecayed old leaves. *I. setosa* has thinnish arching basal leaves; those of *I. Hookeri* are firm or stiff and strongly ascending or erect. *I. setosa* has well developed thinnish cauline leaves, the upper one or that below the lowest fork in forking stems mostly 1–3 dm. long; whereas the flowering stem of *I. Hookeri* is leafless above the base or it may have 1 (on branching stems 2), very firm and stiff upper cauline navicular blade 4– rarely 15 cm. long, borne definitely above the longer basal blades. Of the 270 flowering or fruiting stems before me 42 are quite naked between the tuft of basal leaves and the spathe. In *I. setosa* the outer spathe-bract is blunt to merely acute and usually scarious-margined; in *I. Hookeri* attenuate to a sharp tip and more generally herbaceous. In *I. setosa* the crest of the style-branch is fringed with acicular processes; in *I. Hookeri* the 2-lobed crest has broader and blunter teeth.

I. setosa is a paludal species; *I. Hookeri* non-paludal, most often

a *chasmophyte*, and regularly avoiding the swampy, boggy or marshy areas. This difference in habitat is clearly brought out by such labels as record such usually neglected items and by many reports of field-observers. Thus for *I. setosa* we get the following statements: "bogs", *Van Dyke*, no. 260; "streams", *Harrington;* "wet meadow", *J. P. Anderson*, no. 6624; "meadow", *Nelson & Nelson*, no. 4360; "swamps", *Mrs. Henry B. Looff*, no. 118; "In paludibus", Kudo, Fl. Isl. Paramushir, 94 (1922); "In peninsula nostra tota in pratis ripariis vel silvaticis, in pascuis, ad ripas aquarum et in paludibus sphagnosis gregaria saepe occurrit", Komarov, Fl. Penins. Kamtsch. 308 (1927); "In South Kamtchatka *I. setosa* is a common plant occurring in nearly all lowland associations belonging to the meadow series . . . In the drier formations it is very often sterile", Hultén, Fl. Kamtch. i, 256 (1927); "In meadows and boggy places", Tatewaki & Kobayashi, Contrib. Fl. Aleut. Isl. 117. (1934); "spreading over acres of marshland", Sharples, Alask. Wild Fl. 69 (1938); "Common in marshy places of the interior; on the Bering Sea coast often in wet, brackish meadows", A. E. Porsild in Rhodora, xli. 214 (1939).

As already implied, *Iris Hookeri* finds it very unhealthy, apparently fatal, to have its feet wet. During an intimate field-acquaintance with it, through long periods of summer from 1902 to 1929 my companions and I never saw it in a positively marshy, swampy, or boggy spot nor often in brackish or saline marsh. From the 85 labels before me which clearly indicate the habitat the following summary is derived: rocky or gravelly sea-shore, 16; dry to moist turf or gravel back of beach, 13; dry to moist sands or dunes, 13; humus or meadow back of crest of sea-cliff, 11; dryish upper border of sea-beach, 11; sea-cliffs or headlands, 6; peaty or rocky barrens, 3; dry sandy bluffs or hillsides, 3; talus along coast, 1; springy bank, 1; rocky pasture, 1; salt-marsh, 3; moist place bordering sea, 1; sandy shore back of salt marsh, 1; turfy margin of brackish pond, 1. Of these, it will be noted, only the last 6 are from possibly brackish spots; and when, rarely, *I. Hookeri* approaches the wetter areas it is inclined to cross with *I. versicolor*.

The nomenclature of *Iris Hookeri* Penny ex G. Don in Loudon, Hort. Brit. Suppl. 1: 591 (1832) needs clarification. The first

recognition of it seems to have been as *I. tripetala* sensu Hook. in Bot. Mag. lvi. t. 2886 (1829), where were published a colored plate and a detailed description of a plant cultivated in England and wrongly identified with the Carolinian *I. tripetala* Walt. or *I. tridentata* Pursh. The plate and description are of the maritime plant from farther northeast, though with exaggeratedly long spathes, these, however, being fairly well matched in unusually well developed plants from Newfoundland, such as *Fernald, Long & Dunbar*, no. 26,524 from turfy shore along the Straits of Belle Isle. In his Fl. Bor.-Am. ii. 206 (1839) Hooker placed the plant, without description, under *I. tridentata* Pursh. The name *I. Hookeri* was based exclusively on Hooker's plate 2886. Under that name the northeastern plant remained until the publication of *I. setosa*, var. *canadensis* M. Foster in RHODORA, v. 158 (1903). Apparently the first departure from these two validly and legitimately published names was that of Wherry. In his highly untechnical account of the showier vascular plants of one much visited area, his Wild Flowers of Mount Desert Island, Maine, 37, fig. 24, and 120 (1928) "the arctic[1] Beachflag Iris" is illustrated as *Iris canadensis*, and (p. 120) is enumerated as "*I. canadensis* or *I. setosa*", without any reference to *I. setosa*, var. *canadensis* M. Foster (1903). Just why, when treated as a species, *I. Hookeri* Penny (1832), has to get a new but undefined name, which is said to be equivalent with *I. setosa* (1820), is not made clear, and at best *I. canadensis* Wherry, is a mere *nomen*. However, in the American Iris Society's Alphabetical Iris Check List, edited by Mrs. Wheeler H. Peckham (1929), one finds on p. 71, in the alphabetical series, chiefly of horticultural names, the following sequence: "Camille Thienpont", "CAMMA", "CAMPANEL", "**canadensis.** Trip-B 3 M (Small); *Hookeri, Penny; setosa* var. *Canadensis, Fos.; tridentata.*" Then on p. 132 he finds *I. Hookeri* Penny (1832) reduced outright to the synonymy of the maintained "I. **canadensis**". Dr. R. C. Foster, in his study of North American Iris in Contrib. Gray Herb. no. cxix. 60 (1937), interpreted the new binomial as *I. "canadensis* (M. Foster) Small ex Peckham" and Wherry's *I. canadensis* as based on *I. setosa*, var. *canadensis* M. Foster, although Wherry did not

[1] The Arctic is generally interpreted as including primarily the regions north of the Arctic Circle. The northernmost record which I can find for *Iris Hookeri* is near lat. 58° (well south of the Arctic Circle) on the coast of Labrador.

mention the latter. The Gray Herbarium Card Index has ignored the latter as a mere nomen with no basonym actually cited. At any rate, it is quite unjustifiable to displace the properly founded *I. Hookeri* Penny (1832) by another binomial set up in pretty vague fashion in 1929. Furthermore, the propriety of publishing at this period of plant-nomenclature new *botanical* combinations in a work which is so patently a list of strictly horticultural trivial and not true botanical names may appropriately be questioned, especially when the authors obviously did not understand just what they were doing.

Iris verna L., var. **Smalliana,** var. nov. *I. verna* (Mountain Form) Small in Addisonia, xiv. 15, pl. 456 (1929). Type from oak-barrens, east of Crossville, Cumberland Co., Tennessee, May 2, 1936, *Svenson*, no. 7635 (in Herb. Gray.).

In his very detailed account and beautiful plate of *Iris verna* (Mountain Form) and in his subsequent discussion and plate of true *Iris verna* of the Coastal Plain in Addisonia, xvi. 87, pl. 520 (1936), Small clearly brought out the striking differences between the two series: the Coastal Plain plant (true *Iris verna*), with slender and cord-like whitish straight rhizomes and rootless stolons 2–4 mm. thick and lengthening to 2.5–10 cm. between the thickened rooting crowns, the dark scales becoming remote; var. *Smalliana* of the Blue Ridge, Alleghenies and Cumberland region, southward to northwestern Florida and western Alabama, with the stout and dark torulose rhizome 4–8 mm. thick, with very short constrictions between the thick and freely rooting internodes. The mature leaves of the Coastal Plain *I. verna* become 3–8 mm. broad, with 9–19 ribs; in var. *Smalliana* they are 5–13 mm. broad, with 15–29 (possibly more) ribs. In true *I. verna* the spathe-bracts are subscarious and pale to brownish; in var. *Smalliana* they are firmer and often greener. Small brings out slight differences in the perianths. These I am not situated to verify; but the differences in the capsule I can partly subscribe to, having collected the mature fruits of the Coastal Plain *I. verna*. In this plant the capsule is subsessile or very short-stalked, 1–2 cm. long; while in var. *Smalliana* it is 2–3.2 cm. long and on a stalk up to 2.5 cm. long.

In his first discussion of the "Mountain Form", Small wrote:

"Compared with the present-day members of this group in the mid-Piedmont, the mountain forms are decidedly denser in habit, with shorter and thicker rootstocks, and larger flowers sometimes quite lacking in odor. As the representative of this group which had occupied the Coastal Plain during the Tertiary showed opposite tendencies in these respects, the sum-total of the differences between them is considerable, and were not exact intermediates well developed in their ancestral Piedmont home, the two might well be classed as separate species. As it is, however, they seem best regarded as only geographical forms, as shown in the nomenclature proposed here.

"The known range of the mountain violet-iris extends from South Carolina to West Virginia, usually at relatively high elevations, although it seems to mingle with the Piedmont form to some extent toward the inner edge of that province."

Later, in discussing true *Iris verna*, he wrote:

"On comparing the plants of violet iris which at present grow in the Piedmont of North Carolina and adjoining states with those found on the Coastal Plain, it is found that the latter have developed a more lax habit, with slender, long jointed rootstocks, and a smaller, usually more fragrant flower which has narrower-clawed sepals and longer-clawed petals. These features persist throughout its known range, which extends from central Georgia to southeastern Pennsylvania, on the Coastal Plain and rarely just above the Fall Line on the Piedmont.

"*Iris verna* occurs native in sandy or peaty soil which is strongly acid in reaction, and attempts to cultivate it in ordinary non-acid garden soil have always failed, although it appears to be hardy some distance north of its natural range. While sometimes growing in apparently wet places, its roots are usually well up on dryish hammocks, and it seems to thrive best in sandy open woods where the water table is several inches below the surface."

Others corroborate these observations. Thus, Mr. Francis Welles Hunnewell, having known the loosely stoloniferous plant of the Coastal Plain, tells me that in the Massanutten region he has repeatedly failed to find slender pale stolons on the montane plant; Mr. Carroll Wood, familiar with the latter in the Blue Ridge, makes a similar statement; and Mr. Charles A. Weatherby states that for several years he grew the montane plant, which increased into compact colonies, but that the loosely stoloniferous plant of Coastal Plain sands (in a hotter area than the mountains), although planted in sand, died the first winter. The two are not "forms" in the generally accepted sense but well defined geographic varieties. If the transitions did not occur in the Piedmont they would be as strongly defined as many recognized species in the genus.

Two new Forms.—

Hepatica acutiloba DC., forma **plena,** f. nov. sepalis numerosissimis albidis.—Michigan: along an abandoned road near Scott's Cave, Mackinac Island, June 24, 1947, *J. E. Potzger*, no. 10,793 (type in Herb. Gray).

This "double-flowered" form, sent by Professor John E. Potzger, has the stamens and apparently the carpels all changed to white sepals. Professor Potzger writes that several clumps were noted, all of their flowers of uniform character.

Cornus rugosa Lam., forma **eucycla,** f. nov., foliis maturis orbicularibus vel rotundo-obovatis vix apiculatis tenuissimis.—Nova Scotia: Great Bras d'Or, Iona, Victoria County, August 6, 1946, *Edith Scamman*, no. 4393 (type in Herb. Gray.).

Very unusual in its thin mature leaves almost orbicular and with scarcely apiculate tip; typical *C. rugosa* having the firmer leaves broadly ovate to suborbicular and abruptly pointed.—M. L. Fernald.

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w. Sorbit

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Type of Ribes rigens Michx.

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RIBES HUDSONIANUM VERSUS RIBES RIGENS

Ernest Rouleau

(Plate 1087)

The Hudsonian calciphilous species of *Ribes* known as *Ribes hudsonianum* Richards. was believed to be an addition to the flora of Quebec when in 1944 Rousseau and Rouleau collected the plant at Lake Mistassini.

Ribes hudsonianum was described by Richardson (Bot. App. Frankl. Narr. Journey Shores Polar Sea, 2nd ed., p. 734 (reprint p. 6), 1823) from the Hudson Bay region "principally in lat. 57°, on a calcareous soil, in dry woods". The description agreed very well with the collections made at Lake Mistassini in 1944 as well as others made later by Rousseau in 1946.

During the compilation of a check-list of the plants of the region of Lake Mistassini, it was necessary to include the plants cited by Michaux in his Flora Boreali-Americana (1803). For that region, he mentions five species of *Ribes.* (1) *Ribes recurvatum* (**1:** 109): "ad ripas amnis Larorum (*des Goëlands*) juxta sinum *Hudsonis* [i. e. Rupert River]", now reduced to the synonymy of *Ribes americanum* Mill. of which no further collections have been made during recent explorations in the region of Lake Mistassini; (2) *Ribes albinervium* (**1:** 110): "in Canada, ad amnem *Mistassin*", a synonym of *Ribes triste* Pallas; (3) *Ribes rigens* (**1:** 110): "in Canada, ad amnem *Mistassin*", reduced to *Ribes glandulosum* Grauer by most authors; (4) *Ribes trifidum* (**1:** 110): "juxta *Quebec* et sinum *Hudsonis*", which the majority of authors likewise reduce to the synonymy of *Ribes glandulosum* Grauer; (5) *Ribes oxyacanthoides?* (**1:** 111): "ad lacus *Mistassins*",

which according to Professor Fernald is *Ribes lacustre* (in an annotated copy of Michaux's Flora Boreali-Americana deposited in the Gray Herbarium).

A surprising fact was the reduction of *Ribes rigens* and *R. trifidum* to the synonymy of *Ribes glandulosum.* To the author's knowledge, Michaux never described two species which were subsequently united under the same specific name.

Fortunately, in the collection of photographs of types of the Michaux herbarium in the Institut botanique of the Université de Montréal, both sheets had been photographed. It was therefore possible to check the identities.

The description of *Ribes trifidum*, supplemented by the photograph of the type, permits one to reduce the species correctly to *Ribes glandulosum* Grauer.

The photograph of *Ribes rigens* could not be matched with any specimens of *Ribes glandulosum.* It closely resembles the collection made at Lake Mistassini by ROUSSEAU and ROULEAU.

Michaux's description of *Ribes rigens* reads as follows:

RIGENS. R. inerme, racemis rectis : foliis super glabris, subtus pubescentibus, reticulato-rugosis, lobis dentibusque acutis : racemis laxiuscule multifloris, etiam fructiferis rigescenti-erectis : baccis hispidulis, rubris.
Obs. Baccae uti racemus erectae.
Hab. in Canada, ad amnem *Mistassin.*

The description is supplemented with the following notes given by Michaux on his label: "gros fruits rouges, poileux. Cet arbrisseau est assés abondant sur les Rivierres qui coulent aux Mistassins. Il est chargé de fruits à la fin d'Aoust, le gout est bon, mais un peu l'odeur du Cassis."

If we compare the diagnostic characters which Michaux gives for *Ribes rigens* and those stated by Richardson for his *Ribes hudsonianum,* they are basically the same.

Michaux	Richardson
Ribes inerme, racemis rectis	Ribes . . . inerme, ramis erectis.
Foliis super glabris, subtus pubescentibus, reticulato-rugosis, lobis dentibusque acutis	Foliis trilobis, supra glaberrima, subtus resinoso-punctatis.
Racemis laxiuscule multifloris etiam fructiferis rigescenti-erectis.	Racemis erectis pubescentibus.
Baccis hispidulis, rubris.	Baccis globosis glabris (nigris).

Rehder (Man. Cult. Tr. Shrubs, p. 301, 1940) cites essentially the same characters: "Upright shrub . . . lvs. . . . 3–5-lobed,

with ovate acute or obtusish, coarsely dentate lobes, pubescent and resinous-glandular beneath; fls. . . . in erect, loosely-flowered racemes; ovary resinous-glandular; . . . fr. black."

The only inconsistencies found in comparing the descriptions relate to the fruit. The color of the fruit which Michaux gives was probably based on specimens not fully mature. Many of the plants he collected at the end of August and early September 1803 tend to indicate that the vegetative season must have been retarded that year just as in 1946 (fide Rousseau), it was much later than in 1945 or 1944. On the other hand, Richardson's statement of the fruits being black was probably founded on that of another species since two isotypes deposited in the Gray Herbarium are those of the plant in its flowering stage only. As to the ovary, the "baccis hispidulis" of Michaux agrees with the "resinous-glandular" in Rehder. As stated above, Richardson's fruits ("glabris") were probably from another species. Plants of that interesting *Ribes* are cultivated at the Montreal Botanical Garden so that eventually, a more perfect description of the flowers and fruits will be drawn.

A very striking character noted by Michaux was the taste of the fruit: "le goût est bon, mais un peu l'odeur du Cassis". The "Cassis", i. e. *Ribes nigrum*, the European Black Currant, is characterized by the peculiar heavy odor of the leaves and fruits when bruised. The same is true with *Ribes rigens* Michx. The fact is so striking that the Indians call this Currant "*chicacominanatouk*" (skunk-berry shrub) while the other species are globally grouped under "*opiominanatouk*".

From the above discussion, it appears that the well-characterized *Ribes* described by Michaux in 1803 under the name *Ribes rigens* antedates *Ribes hudsonianum* Richardson, 1823.

Institut botanique, Université de Montréal.

A new Clematis from the Peaks of Otter.—

Clematis verticillaris DC., var. **cacuminis,** var. nov., a var. typica recedit sepalis oblongo-ellipticis apice rotundatis vix apiculatis 2–3.3 cm. longis, crassioribus dorso cinereo-pilosis.—Bedford County, Virginia: among rocks, roadside-bank, near summit of Sharp Top, Peaks of Otter, May 8, 1947, *Ruskin S. Freer*, no. 1385 (type in Herb. Gray.).

Typical *Clematis verticillaris* DC., Syst. i. 166 (1817), based on *Atragene americana* Sims, Bot. Mag. xxiii. t. 887 (1806), has the broadly lanceolate to lance-oblong sepals tapering to acute, acuminate or even subulate tips. The sepals vary from 3–5.5 cm. long and when dry are membranaceous and almost translucent, their veins clearly visible, and their backs are only sparsely pilose or glabrescent. This typical *C. verticillaris* occurs from the Gaspé Peninsula of Quebec to Manitoba, thence south to New Brunswick, New England, Delaware, Pennsylvania, northern Maryland, West Virginia, Ohio, Michigan, Wisconsin and northeastern Iowa. Small reports it as extending down the Blue Ridge to North Carolina. I have seen no material from the Blue Ridge of Virginia or North Carolina until the fine sheet from Professor Freer. It is not improbable that the plant of the Blue Ridge of North Carolina may be like that of the Peaks of Otter, which differs from typical *C. verticillaris* in its oblong-elliptic subcoriaceous round-tipped sepals only 2–3.3 cm. long, their backs densely cinereous-pilose. The young foliage, at flowering time is more pilose than in the glabrous or quickly glabrate wide-ranging plant.—M. L. FERNALD.

NOTES ON DRYING PLANTS

JULIAN A. STEYERMARK

A sufficient number of papers have already been published which give ample directions to collectors for preparing and collecting plant specimens[1]. During the past two years a few of them discussed the methods employed and relative advantages obtained in using artificial or natural heat[2]. While each of these articles possesses its own merits, the differences in point of view indicated might suggest that one side favored specimens natu-

[1] 1. BLAKE, S. F. Directions for collecting flowering plants and ferns. U. S. D. A. Dept. Circular 76. 7 pp. Jan. 1920.

2. GLEASON, H. A. and A. C. SMITH. Methods of preserving and arranging herbarium specimens. Jour. N. Y. Bot. Gard. 112–125. 1930.

3. JOHNSTON, I. M. The preparation of botanical specimens for the herbarium. Arn. Arbor. Publ. 33 pp. 1939.

4. FOGG, JOHN M. Suggestions for collectors. RHODORA 42: 145–157. 1940.

[2] Fernald, M. L. Injury to Herbarium Specimens by Extreme Heat. RHODORA 47: 258–260. 1945. Lundell, C. L. A useful method for drying plant specimens in the field. Wrightia 1: 145. 1946. Camp, W. H. On the use of artificial heat in the preparation of herbarium specimens. Bull. Torr. Bot. Club 73: 235–243. 1946.

rally dried, whereas the other preferred those artificially dried. The present writer has had considerable experience in the preparation of herbarium material, and has used the various methods concerned with both the artificial and natural drying of specimens. The purpose of the present paper is to weigh the arguments on both sides, with the hope of showing that each possesses its advantage.

Although artificial heat (electricity, kerosene or gasoline lanterns or stoves) with its accompanying corrugated ventilators (pasteboard or metal) may be used under any circumstances in rainy or dry climates, provided one is equipped to use that form of heat, the same can not be stated for the method of natural drying. During the collecting season in the United States, generally speaking, one can usually depend upon an adequate amount of daily sunshine with its attendant heat to dry a large quantity of plants with driers ("blotters"). It is a simple matter to spread out the absorbent felts in the sun to dry during the hottest parts of the day (generally noon or afternoon), then to pick them up, and finally replace them between the sheets of paper containing the plants. Specimens dried by such natural heat generally appear superior to those dried by artificial heat. The blotter apparently absorbs moisture from the various parts of the plant evenly and gradually; the warmer and drier the blotter, the more rapid the absorbing process. All parts of the plant are pressed flatter with equal pressure applied throughout, so that the specimen never becomes as brittle or inclined to wrinkle unequally as in artificially dried ones, and is more flaccid and softer so that it can be handled without undue breakage. Natural-dried specimens seem to give the best results as far as the appearance and keeping qualities of the specimen are concerned. Where sun is not dependable, and where other methods can be resorted to, similar results may be obtained with driers by using, as did Fernald and Long, heat from the engine room of steamers, or, if one has time, pressing with a hot iron. The latter involves ironing a single specimen at a time and passing a hot iron (electric or carbon) over the blotter which lies on top of the plant specimen. In extreme cases where one is using blotters, and there is no sun, engine room, or hot iron available, the only alternative is to heat the individual blotters over a fire, turning

over each side until sufficiently dry and warm. This last method is by far the most time-consuming and laborious, but, in isolated instances, is the only method available and saves the specimen from spoiling.

While there can be no doubt, judging by the writer's own experience, and by the examination of thousands of specimens dried by natural heat, that that method produces the best-looking and best-preserved specimens, yet it is impractical, if not impossible, to use that system in the regions and seasons of heavy rainfall or cloudy humid surroundings. Even though care has been used in the manner of drying with artificial heat, the end result is not as good as that produced by sun-dried blotters. However, and this is the important point, it is far better as Dr. Camp stated, to return with some specimens, though relatively inferior in aspect, from a hitherto uncollected area, than without any specimens at all.

The above statements refer to the overall result yielded by the two methods with an evaluation of their uses under differing conditions of field work. The following statements specifically concern various features of drying specimens with artificial heat. Although this method is used by various collectors in tropical regions, it is employed under varying conditions and in different degrees, so that any uniformity or rule-of-thumb procedure apparently does not exist. This means that the method now employed may be defective in certain respects, leaving various gaps to be filled in and refinements to be made in future field work.

The writer has found that the method roughly outlined by Dr. Lundell[3] is the most practical for field work in tropical and sub-tropical regions. Since it yields such excellent results, it seems advisable to describe it in somewhat more detail than Lundell has done, in order that certain features of the method may be outlined more fully. Lundell states that "by varying the number of lanterns under a press, and by regulating the height of the flame, the desired amount of heat can be obtained." Stated more definitely, the present writer has observed that usually four kerosene lanterns of standard variety with large glass globes, such as Dietz Junior Wizard, placed equidistant from one another,

[3] Lundell, C. A. A useful method for drying plant specimens in the field. Wrightia 1: 161–162. 1946.

give the best results for a press varying in length from 1½–2½ feet. The four lanterns are placed directly below areas corresponding to the four corners of the press, so that all parts of the press receive approximately the same amount of heat. If the press is very large and bulky, i. e. from 2½–3 feet long, a fifth lantern is generally placed in the center with the other four lanterns at the corners. As the press becomes reduced in size, due to gradual extraction of dried material, one or more lanterns are removed to accommodate the shrinkage in press size. A very small press only 6 inches to a foot thick may require only two lanterns placed at either end. In any event, the lanterns are never placed so closely as to touch, because too much heat may cause overheating of the specimens, causing them to discolor to a marked degree, as well as causing the lanterns to overheat, with a possibly much enlarged flame which in turn leads to smoking of the lantern. Lanterns thus placed are left burning all day and all night. The amount of kerosene held by the type of lantern described above will be adequate to keep the flame going approximately 24–28 hours, after which period the lanterns are removed and re-filled. This is kept up on succeeding days with the collector examining the presses daily to extract the dried plants.

Whether to use corrugated sheets or cartons on either side of the folded paper containing the plant specimen, without the use of driers, or to alternate driers and corrugated sheets is a question often pondered upon in discussions on the subject. In the writer's experience, the best specimens appear to result from the original use of hot dry driers only for the first day. Then, after having been subjected to great pressure, a change is made to artificial heat, using corrugated aluminum sheets or double-faced pasteboard cartons. Depending upon the type of material, the method varies. For example, with very thick palm stems and leaves, bromeliads, orchids, cacti, and other thick bulky materials, the use of aluminum sheets without driers placed on both sides of the specimen is preferable to the pasteboard cartons not only in the matter of drying the specimens more rapidly, but also in that the bending and breaking does not occur as happens when the pasteboard cartons are used for such thick specimens. For normal foliage that is firmly membranaceous to subcoriaceous

or coriaceous, either aluminum sheets or double-faced pasteboard cartons without blotters placed on either side of the plant specimen serve the purpose well and give good results. However, for very thin and delicate leaves or flowers, a drier placed on one side of the specimen with a corrugated pasteboard carton or aluminum sheet on the other side, with or without another blotter, prevents the specimen from becoming broken or showing unnecessary corrugations.

Users of kerosene lanterns or lamp stoves should beware of dirty or impure kerosene. Such kerosene results in uneven burning and absorption of carbon particles by the wick, with eventual carbon accumulation on the wick. All this leads to the smoking of the lantern or to extinguishing the flame. Smoking of the lantern is a bothersome situation, requiring the cleaning of the globe and trimming of the wick. If this happens frequently, it can be a most time-consuming job to clean a dozen or more globes and to re-trim wicks. Ordinarily, with the use of clean kerosene it is not necessary to resort to the above procedure more than every other day on the average.

When the lanterns or stoves are first filled one should use care to note that the wick is not turned too high in the beginning, since for the first half hour or so after the wicks are lit in a full lantern, the flame tends to be more active and shoots higher above the edge of the wick. It is well to examine the height of the flame during this period for the first hour. If left unattended, there is every likelihood that the wick may have been raised too high, and, if so, the flame may rise higher than it should and cause smoking. Generally, if such smoking takes place in a kerosene lantern, the smoking tends to smother and extinguish the flame, but in the case of the lamp stoves there is danger, if left unattended, of the flame shooting above, and setting fire to the press. There is real reason, therefore, to watch this part of the drying routine.

Another point which may be mentioned is that of ventilation. Of course, as noted by others, it is essential that the cloth skirt surrounds the press and that it extends from the base of the ground surface to the top, but does not cover the top. Besides this, however, the writer's personal observation is that some ventilation must be provided on one side at the base of the skirt,

generally a single flap or opening effected by an upright support from a piece of wood or metal. Such an opening permits a continuous circulation of air to pass from the bottom and to be drawn up through the passages of the corrugations within the press and to pass out eventually at the top. It is well known that not only the factor of heat, but also that of air currents, help to dry out the specimens. It would appear reasonable, therefore, that provision for an opening at the ground level, allowing for greater induction of air currents to pass upwards, would help dry the plant tissues more rapidly. Apparently, such is the case, judging from the writer's personal observations. It may also be mentioned in this connection that lack of such ventilation at the base of the press makes the lanterns heat up too much. Under certain extreme field conditions, however, such as exposure to violent wind- or dust-storms, or excessive rainy or humid weather, it has been found that such basal ventilation is not necessary.

Dr. Lundell suggests that, "the boxes in which the kerosene tins are shipped serve admirably for end supports of the poles where the use of forked sticks is not feasible. In field work in Texas and northern Mexico, a collapsible frame made especially for the purpose has proven satisfactory, for it can be set up in garages of tourist courts, or in other available space." While the writer endorses the above statements, he has found that the boxes used in transporting equipment of the expedition serve as convenient props for the presses. Such boxes are rectangular, about twice as long as wide, and generally 4–6 inches higher than the top of the kerosene lantern. If the lanterns are placed too near the press, they may cause too rapid drying or cooking of the specimens, producing a browning effect, or may even lead to burning of the specimens. On the other hand, if placed too far from the presses, insufficient heat reaches the specimens in a given time and drying proceeds too slowly. If the lanterns are too low, they may be set upon equal supports to bring them up to the desired level. The writer sometimes carries wooden blocks for this purpose. The presses are so placed that just the edges of the press rest on the edges of the box, so that all the specimens within the press receive heat. It is, of course, essential with the use of boxes or any other support that the ground be level. No problem is offered if one has the use of wooden or cement surfaces,

but in outdoor camps or native huts where soil is the usual medium, it is necessary to be certain of a uniformly flat surface. An uneven surface may place some of the lanterns or stoves closer to the press than others and effect uneven drying of the specimens. The machete is often found useful in leveling the ground for this purpose.

The above hints in general cover some of the more important problems which one encounters in the routine of drying plants by artificial heat. In the remainder of this article, some notes are appended in connection with certain features of the drying process discussed by Camp, Fernald, and Long. When and how often to straighten the leaves was brought up for discussion in Dr. Camp's paper in reference to a point made by Mr. Long. The writer has found that straightening the parts of the specimen is necessary usually twice, the first time when the specimen is being originally prepared for the press at the time of recording its number and indicating the field data, the second time, at the end of the first 24 hours after being removed from the press with driers, and before being placed in the permanent press of corrugated cartons or sheets. This would corroborate the statements made by Camp that "ample opportunity would be afforded for a preliminary arranging of the specimen as it was first placed in press and also for a final inspection and fixing after the sweating process is complete and just before being placed in position for drying." After the first 24 hours most of the specimens are still fresh enough to have their leaves straightened and to have the necessary arranging attended to. As Dr. Camp states "it is a rare specimen indeed which at the end of a 24-hour period of sweating is not sufficiently tamed that its parts will not lie in place when arranged for the final drying."

In his final remarks Dr. Camp intimates that it is part of the job of drying plants with artificial heat to "wake up two or three times during the night and crawl out from between warm blankets to check the fires and see that the press fastenings are snug". Actually, my own experience does not bear this out. Before retiring the present writer checks the flame and wicks on the kerosene lanterns and checks on the press straps to see that they are tight so that the press is not loose. There is no need of getting out again during the night to check such details, and

upon the following morning the re-examination of the lanterns and press straps is made. With sufficient practice and regularity of this habit such matters take on a routine nature without so much as a disturbance of one's slumber.

CHICAGO NATURAL HISTORY MUSEUM.

POSTGLACIAL FOREST SUCCESSION, CLIMATE AND CHRONOLOGY IN THE PACIFIC NORTHWEST (A REVIEW OF THE STUDY BY HENRY P. HANSEN[1]).—Dr. Hansen presents in this paper the results of many years of painstaking investigation of peat deposits in the Pacific Northwest. Most of the data used have come from profiles of pollen-bearing strata located in western Washington and western Oregon, though some representative profiles were also made in the eastern parts of these states and in northern Idaho.

The paper will be of great value in the development of the study of pollen analysis in America, not only because of the care and thoroughness with which the work itself has been done, but also because of the skill utilized by the author in placing the many profiles studied in their proper topographic and geographic positions. One of the criticisms that can be leveled against much of the pollen analytical work done in America has been the lack of its proper correlation with the physiographic history of the regions involved.

Volcanic eruptions in the Northwest coastal area during postglacial time have caused the deposition of ash over wide areas. The precise dates of the eruptions are not fixed, but Prof. Hansen has used the ash layers to very good advantage as points of correlation among his various peat profiles.

The paper as a whole is divided into 13 chapters or sections, with an extensive list of references and an index at the end. The chapters fall into three groups, the first of which contains introductory and general descriptive matter. The second consists of an analysis of the various profiles studied, in terms of general postglacial vegetational history. Finally, there is the author's discussion of his findings as they indicate postglacial climate and chronology.

Following acknowledgments and introduction, there is a brief history of pollen analysis and a discussion of the theories upon which it rests. Then comes an account of the geologic origins and ages of land surfaces in the Pacific Northwest. In this and the following chapter, which is on pollen-bearing profiles of the Pacific Northwest, the geographic subdivisions for the entire discussion are set up. These subdivisions are looked upon as natural areas. They "approximate physiographic divisions, but they are delimited largely upon the basis of homogeneity of vegetation and climate, and to some extent by the geologic history." The natural areas are: Olympic Mountains, Coastal Strip, Klamath-Siskiyou region, Oregon Coast Range, Puget-Willamette lowland, Cascade Mountain range, Northern Great Basin, Blue Mountains, Columbia Basin, and the region of northeastern Washington and northern Idaho.

The next two chapters deal with the late-glacial and post-glacial chronology of the region and with the probable rate of organic deposition in various areas. In a chapter on methods and technique, the author explains with great care his methods of collecting and preparing samples, and outlines the technique of sampling used in his statistical studies of fossil pollens. Perhaps the most important part of this chapter is concerned with the much debated problem of the identification of the pollens. The author makes free use of the size-range method of checking fossil pollen identification, and utilizes size-frequency

[1] Trans. Amer. Phil. Soc. N. S. Vol. 37, Pt. 1: 1–130. 114 text figures, map. 1947. $2.25.

charts for the identification of the pollens of pines, firs, and spruces. Certain common conifers of the Northwest coast are not well represented in the profiles due to the poor preservation of their pollens. Such are the western red cedar (*Thuja plicata*), Port Orford cedar (*Chamaecyparis Lawsoniana*), Alaska cedar (*C. nootkatensis*), incense cedar (*Libocedrus decurrens*), redwood (*Sequoia sempervirens*), and western juniper (*Juniperus occidentalis*). Following the discussion of methods, there is a chapter on the climatic features of the Pacific Northwest outlined in terms of the major natural areas.

The final two chapters in the first group are devoted first to a general classification and description of the forest types of the region; and second, to a description of the general ecology of the principal species in the forests. The second of these chapters is an excellent addition to the book and sets a precedent for future studies of this kind. One could wish that the treatment given each species could have been more complete.

The postglacial vegetational history is outlined geographically according to the principal natural areas. Pollen profiles are given for the various peat sections studied, many of them composite curves showing the frequency distribution of individual species in several of the sections. Those who have tried to do this sort of work will appreciate the extraordinary amount of painstaking labor that has gone into the making of the diagrams.

The final chapter of the discussion begins with a general statement of the problem of correlation between climate and vegetation, and of the problem of setting up a chronology to fit the sequence of events. There is a brief summary of earlier schemes, such as those of Blytt and Sernander, De Geer, von Post, and Antevs. An attempt is made, with only partial success, to correlate eastern North American and Northwest coast chronologies. The author's findings tend to support the von Post hypothesis, which postulates a period of increasing warmth following the disappearance of the ice, a period of warmth in which temperatures were greater than those of today, and a period of decreasing warmth to the present. The period of greatest warmth, commonly known as the postglacial optimum, he sets between 8000 and 4000 years ago. His interpretation of postglacial events in the development of climates, vegetation, and human occupance appears to show reasonably good correlations among its various parts.

The hazards attendant upon any attempt to draw up the outlines of postglacial vegetational history are all in evidence in this paper. They are legion, and appear to be clearly understood by Professor Hansen. The labor of acquiring the materials, preparing the samples, and of securing and analyzing the final data is not the least of these hazards. The proper situation of the various profiles in terms of the chronology of the land surfaces is a difficult problem, and its correctness rests upon a correct interpretation of glacial and postglacial geomorphic events. The incompleteness of our knowledge in this field is evident to anyone who has tried to relate vegetational development to surfaces in glaciated North America.

The identification of pollens is difficult and fraught with many uncertainties. In this country at least, it is yet in the hands of a very small number of those experts who have been willing to devote the large amount of time necessary to learning pollen taxonomy. In spite of a considerable number of published papers on certain groups, there is yet no well-codified knowledge of our native pollens. Until this body of knowledge is developed and organized to the point where it can be used freely by many people, the dissemination of the data on pollen profiles will be very greatly impeded. To this must be added the lack of definitiveness in the identification of species by their pollens. Size-frequency methods are open to criticism on more than one count. The distribution of size-frequency within many species is not known. Likewise the differing effects of the usually rigorous chemical and mechanical treatments given to pollen samples are poorly understood. When size-frequency methods can be checked by size-range studies, as Prof. Hansen has used them, they are obviously much more reliable.

The variable efficiency of preservation among the pollens of different species has long been recognized and cannot be disregarded. The number of species in the northwest coast flora whose pollens are not well preserved is considerable, and one wonders how the interpretations of the profiles would be modified if the relative abundance of these species at different periods were known. At this point, as well as throughout his discussion, Prof. Hansen has to rely upon the assumption that the trees of the Pacific coast forests are reacting to their physical environments and to each other now as they have in all of post-glacial time. There is in this assumption the idea that the occurrence and distribution of biotypes within the species has been identical or nearly so throughout the post-Pleistocene. To date, there is no proof of this. On the other hand, there are many suggestions in the studies of Stebbins, Anderson, Hultén, and many others. that notable changes have taken place with the expansion of species populations from Pleistocene refugia and mergence of these populations with others. Prof. Hansen makes no mention of such possibilities in his discussion. Küchler has postulated a biotype depauperation among the hardwoods of the Pacific Northwest during the ice age, but how effective this process was among the conifers is unknown.

Prof. Hansen is to be highly commended for an excellent discussion and a fine contribution to pollen analytical studies in America. He has threaded his way among the difficulties of the subject and its methods with great astuteness, and in spite of them has produced a well-reasoned paper.—Hugh M. Raup.

MINOR TRANSFERS IN PYRUS

M. L. Fernald

It seems to me quite impossible to maintain *Malus* Mill., *Sorbus* L. and *Aronia* Medicus as genera truly distinct on stable morphological characters from *Pyrus* L., unless we are to base our genera on merely local representatives and conveniently to ignore what these groups do in areas not so familiar to us. To those who know *Sorbus* only as it occurs as a series of indigenous trees in North America it is very conspicuously different, in its odd-pinnate leaves, very much branched cyme, and small fruits without grit-cells, from our introduced pears or from the apples, which have simple (though often lobulate) leaves, unforking pedicels, larger fruits with or without grit-cells etc. If we look into the Eurasian representatives of *Sorbus*, however, we shall quickly see that many of its species there have simple leaves, some of them with few (down to 6)-flowered inflorescences, which in fruit have almost simple branches or pedicels. Witness *Pyrus Miyabei* Sargent, illustrated, life-size, in a full-page figure in Garden and Forest, vii. 85, fig. 19 (1894), with leaves suggesting those of *Alnus*, a sparsely branched inflorescence of pear-like or apple-like flowers (shown 1.5 cm. broad) and a little inflorescence of 4 fruits, with deciduous calyx as in *Pyrus baccata* L. or *Malus*

baccata (L.) Borkh. Sargent, with growing material before him, considered it a *Pyrus*. Others, for instance Bailey in his Stand. Cycl. Hort. vi. 3179, treat it as *Sorbus alnifolia* (Sieb. & Zucc.) K. Koch and Bailey reproduced ("adapted") Sargent's illustration of his *Pyrus Miyabei* as representing typical *Sorbus alnifolia*. Rehder, likewise, in his Man. Cult. Trees and Shrubs, ed. 2: 380, 381 (1940) reduces *P. Miyabei* to *S. alnifolia*, with "infl. loose, 6–10-fld.". Since the fruit of this species is "subglobose, 8 mm. across, red and yellow" and "with deciduous calyx", it suggests to those not wholly on the inside the fruit of *Malus baccata*, described also by Rehder (pp. 392, 393): "fr. subglobose, 8–10 mm. across, red or yellow; calyx deciduous". If *Sorbus* is thus demonstrated to be a sound and morphologically different genus from *Malus* the profound difference is not made clear. *Malus*, by Rehder's description has "styles 2–5, connate at base" (p. 390); *Sorbus* has the stated distinction: "carpels 2–5, . . .; styles free or connate at base" (p. 373). Sargent's illustration of *Pyrus Miyabei* shows them connate at base as in *Malus*. Take your choice. I can see only one course, unless those who here see different genera know of fundamental differences which they can not express.

Aronia, with "styles 5, connate at base" is held apart from *Sorbus* (again using Rehder's keys) as follows:

Styles 2–5: lvs. pinnate or simple and often lobed, usually with excurrent veins: calyx-lobes sometimes deciduous 18. *Sorbus*

Styles 5, connate below: lvs. simple, with curving veins, glandular-denticulate, glandular on midrib above: calyx-lobes persistent........................19. *Aronia*.

Obviously since, for example, the simple-leaved species of *Sorbus* § *Aria* have "fr. with persistent calyx-lobes", while the type of the section, *S. Aria*, has the styles "connate at base", those characters do not constantly separate *Sorbus* and *Aronia;* while *Malus*, with "Styles connate at base", has species (*M. baccata* etc.) separated from their allies because of "Calyx deciduous", the three species of this subgroup having respectively "styles 5, rarely 4", "Styles 3, rarely 4" and "Styles 4 or 5". Turning to *Aronia* with "Fls. in compound corymbs or panicles", the "compound corymbs" are often so simple and with such simple pedicels that they are "compound" only through wishful

thinking. Thus, in *Aronia prunifolia* (Marsh.) Rehder (*Pyrus floribunda* Lindl.) a very large proportion of the specimens in the Gray Herbarium have only 2 (even only 1)–5 or 6 flowers or fruits, each on an unforking pedicel; others, from farther south, have "compound corymbs". Similarly, *Aronia arbutifolia* (L.) Ell. (*Pyrus arbutifolia* (L.) L. f.) has "compound corymbs" through the southern two-thirds of its range, but at the northern limit of its range Nature did not clearly understand that it must have "compound corymbs", for there a large proportion of inflorescences consist of 1–6 unforking pedicels. The simpler or less compound inflorescences in *Aronia* are amazingly similar to the fruiting inflorescence of a *Pyrus* or of *Sorbus alnifolia*, as illustrated by Sargent and copied by Bailey.

By Rehder's key *Malus* has "fr. usually apple-shaped, without or with few grit-cells", while *Pyrus* has "fr. usually pear-shaped, its flesh with numerous grit-cells". But *Malus*§§*Eriolobus* and *Docyniopsis* have "Fr. with grit-cells", while, as pointed out by me in Rhodora xlv. 451 (1943), "of the Pears treated in Rehder's Manual ('fr. usually pear-shaped') 13 out of the 15 species have the fruit described as 'globose' 'globular' 'subglobose' or 'ovoid'; while such a species as *Malus Halliana* is described in Rehder's key as having 'fr. pyriform'. The terms 'apple-shaped' and 'pear-shaped' thus become a bit vague". When, furthermore, we consider *Pyrus domestica* (L.) Sm. or *Sorbus domestica* L., we get pretty far from conventional *Sorbus*. *S. domestica*, with pinnate leaves of Mountain-Ash, has "Fr. 1–3 cm. across, apple- or pear-shaped, yellowish, with red cheek and with grit-cells" (Rehder). The fruit, according to Bean, Trees and Shrubs Hardy in Brit. Isl. 296 (1914), "is sometimes eaten in a state of incipient decay [as is that of the subglobose-fruited Chinese Pear, *Pyrus pyrifolia* (Burm. f.) Nakai (which Burmann thought to be a fig!), much naturalized in southeastern Virginia], especially in France . . . Mr. E. Burrell, late gardener to H. R. H. the Duchess of Albany at Claremont, in a letter . . . observes that 'we are sending good fruits of the pear-shaped service for dessert at the present time'". Her Royal Highness might not have been so pleased had he sent for dessert the fruits of *Sorbus Aucuparia*, a conventional Mountain-Ash.

Another point. Although *Malus* is too conservative to mix

itself in nature with the others, *Sorbus* and *Aronia* freely hybridize, producing mongrels of very nondescript appearance, × *Sorbaronia* Schneid.; *Sorbus* likewise crosses with *Pyrus*, producing × *Sorbopyrus* Schneid.; it will also mix with *Amelanchier*, producing × *Amelasorbus* Rehder. What wonder, then, that, within its own reputed confines *Sorbus* may in foliage and fruit simulate *Malus* and in its fruit simulate *Pyrus*. Cytologists have shown that cytologically there is no valid ground for separating *Pyrus*, *Malus*, *Sorbus* and *Aronia* and such an unquestioned anatomist as Professor Irving W. Bailey tells me that anatomically the woods are essentially indistinguishable. I am content to leave *Pyrus* intact, in this agreeing with DeCandolle, Endlicher, Bentham & Hooker, Focke, Engler & Prantl, Gray and many others of sound and world-wide outlook.

Unfortunately the following members of the complex genus *Pyrus* require formal transfers:

PYRUS CORONARIA L., var. **dasycalyx** (Rehder), comb. nov. *Malus coronaria* (L.) Mill., var. *dasycalyx* Rehder in Journ. Arn. Arb. ii. 52 (1920).

P. CORONARIA L., var. **lancifolia** (Rehder), stat. nov. *Malus lancifolia* Rehder in Trees and Shrubs, ii. 141, pl. 158 (1911). *P. lancifolia* (Rehder) L. H. Bailey in RHODORA, xviii. 154 (1916).

I find myself heartily in agreement with that cautious and very experienced student of plants in the field, Dr. C. C. Deam who wrote in his Flora of Indiana, 528 (1940): "The genus *Malus* of 'Trees of Indiana' was written by W. W. Eggleston. A careful restudy of my specimens convinces me that those using a local flora of this kind will be best served by regarding this species [*M. coronaria*] as polymorphic in many of its parts. Specimens can be found that show wide differences but these can be connected by intermediates". Even so, vars. *dasycalyx* and *lancifolia* seem to be reasonably good geographic varieties. This can not be said for many recently proposed segregates in the group.

× P. **Jackii** (Rehder), comb. nov. *Sorbaronia Jackii* Rehder in Journ. Arn. Arb. xx. 95 (1939).

× P. **mixta,** nom. nov. *Mespilus sorbifolia* Poir. Encycl. Suppl. iv. 73 (1816); *Crataegus sorbifolia* Hort. ex Poir. l. c. (1816). *Sorbus sorbifolia* (Poir.) Hedl. in Kgl. Sv. Vet. Akad. Handl. xxxv[1]. 114 (1901); *Sorbaronia sorbifolia* (Poir.) Schneid. in Fedde, Repert. Sp. Nov. iii. 134 (1906); not *Pyrus sorbifolia* Cham. ex

Spreng. Syst. iv. Cur. Post. 343 (1827). *Sorbus Sargenti* Dippel, Handb. Laubholzk. iii. 373 (1893), not *Pyrus Sargenti* (Rehder) Bean, Trees and Shrubs Hardy Brit. Isl. ii. 293 (1914).

P. DECORA (Sarg.) Hyland, var. **groenlandica** (Schneid.), comb. nov. *Sorbus americana* Marsh., var. *groenlandica* Schneid. in Bull. Herb. Boiss. sér. II, vi. 314 (1906). *S. decora*, var. *groenlandica* (Schneid.) G. N. Jones in Journ. Arn. Arb. xx. 30 (1939).

× P. **fallax** (Schneid.), comb. nov. *Sorbaronia fallax* Schneid. Handb. Laubholzk. i. 676 (1904).

NAJAS MUENSCHERI AND OTHER SPECIES OF NAJAS IN EASTERN VIRGINIA

ROBERT T. CLAUSEN

Prof. Fernald (RHODORA **49:** 105–106. 1947) has commented on the *Najas* found in the Virginian estuaries. Tentatively he has identified his and Mr. Long's collections as ? *N. flexilis, N. guadalupensis* and ? *N. gracillina*. The specimens which are the basis for these reports have been made available to me through the courtesy of Prof. Fernald. I report on them in the order as listed by him.

? "N. flexilis (Willd.) Rostk." Three collections are involved: Fernald and Long no. 12,520 from the Mattaponi River, King William County, and F. & L. nos. 12,523 and 13,214 from the Chickahominy River, New Kent and Charles City Counties respectively. These plants have the habit of *N. Muenscheri*. The styles are 0.5–1.2 mm. long. The seeds are slender, four to five times as long as wide, 2.2–2.6 mm. long and 0.4–0.5 mm. wide. Only a few seeds are so far available, making a detailed study of variation impossible. Seven mature seeds average 2.5 mm. in length. Seeds of *N. Muenscheri* in the Hudson River average 3.2 mm. in length with extremes of 2.4 and 4 mm., and extremes in width of 0.6–0.7 mm. The seeds of the collections from Virginia are lustrous, as in *N. flexilis*, but with very small areoles as in *N. Muenscheri*. These areoles often tend to be longer than wide, whereas in *N. flexilis* the majority of the areoles are as broad as long, also larger. Except for the length of the seeds, the Virginian specimens match the collection of Muenscher and Clausen no. 4273 from the mouth of the Mohawk River, Waterford, N. Y. The specimens from Waterford, with lustrous

seeds, 3–4 mm. long, were first identified as *N. flexilis* (Clausen, Rhodora **38:** 333–345. 1936), then included under *N. Muenscheri* (Clausen, Rhodora **39:** 57–60. 1937). Except that the largest seeds of the plants from Virginia are 0.4 mm. shorter than the smallest seeds from New York, the seeds are the same. S. S. Chase, who has been studying *Najas* cytologically, reports similar smooth-seeded plants of *N. Muenscheri* from two, possibly three, other localities in the Hudson Drainage (S. S. Chase, Preliminary studies in the genus Najas in the United States. A thesis presented to the faculty of the Graduate School of Cornell University, Feb., 1947.). In view of the fact that the three collections from Virginia are most similar to the lustrous-seeded *N. Muenscheri,* I now identify them as this species, even though an exact match of the Virginia and New York material is not possible. The smallest seed of *N. Muenscheri* yet found in the Hudson River, obtained from Muenscher and Curtis no. 5500 from Imbocht Bay, the type locality, is 2.4 mm. long, but the seed-coat is rough. The smooth, lustrous seeds so far collected in New York are all a trifle larger than the seeds of the plants from Virginia, but experience with other species of *Najas* indicates that considerable variation in size of seeds may occur. Prof. Fernald's original report of the plants from Virginia, on a postal received in September, 1940, was as *N. Muenscheri.* A superficial study by me in January, 1941, led to the conclusion that the specimens might be *N. flexilis.* Now, after careful study, I verify the conclusion that they are *N. Muenscheri.*

The discovery of *N. Muenscheri* in Virginia raises again the problem of the status of this species. Chase (*l. c.*) favors the possibility that it originated through hybridization, possibly involving three species as parents, namely *N. guadalupensis, N. gracillima* and *N. flexilis.* The first two are present in Virginia. The last still is not definitely known from the state, though it may yet be found and possibly did occur there in Pleistocene time. That our North American naiads had very different distributions in the glacial period seems reasonably certain. In 1941, Dr. W. C. Muenscher showed me some seeds of what appeared to be *N. Muenscheri* from a peat deposit in a lake in Louisiana. Unfortunately, no further data are available about these. Such occurrences, however, confirm the possibility of a hypothesis

such as that advanced by Chase, providing that we allow that perhaps the cross or crosses happened a long time ago. The population in the Hudson River seems fertile, self-perpetuating and well established. Less is known about the plants in Virginia. At least they are somewhat fertile. Until we know more about the details of reproduction and genetics concerning them, their designation, along with the plants from New York, as *N. Muenscheri*, seems reasonable. They can not with certainty be designated as hybrids of any two species. Instead, the plants from Virginia have lustrous, hard seed-coats as in *N. flexilis*, a feature not possessed by either of the associated species, *N. gracillima* and *N. guadalupensis*. Since available distributional data suggest that they do not constitute a geographical population of taxonomic significance, the specimens of *N. Muenscheri* with smooth, lustrous seeds are not now given nomenclatural status.

"N. GUADALUPENSIS (Spreng.) Morong." My identification of the collections cited by Prof. Fernald is in agreement. The only comment necessary has to do with the citation of authors for the species. In my earlier writing on *Najas*, I followed the majority of American writers in citing Morong as the author of the binomial in *Najas*. This is incorrect. Magnus, in 1870, on p. viii of his "Beiträge zur Kentniss der Gattung Najas L.", combined *N. microdon* A. Br. and *N. guadalupensis* (Spreng.) (based on *Caulinia guadalupensis* Spreng.), using the latter name for the species. Since Morong's publication in 1893 was 23 years later than that of Magnus, we should write the name as *Najas guadalupensis* (Spreng.) Magnus.

"?N. GRACILLIMA (A. Br.) Morong." The specimens of Fernald and Long, nos. 12521, 13511, 13510, 13213 and 13512, from the Mattaponi River, Lacy Creek and the Chickahominy River, are robust, perhaps more so than those from elsewhere, but until I know what factors are responsible for this difference in texture of stems and to a lesser extent leaves, I hesitate to interpret the specimens as anything except *N. gracillima*. The coarser, heavier stems may be the result of environmental factors or, if genetical, might indicate contamination of the population of the Virginia coastal area with the characteristics of some other species. The stipular sheaths, mentioned by Prof. Fernald, impress me as

coming within the range of variation known for *N. gracillima.* The author of the binomial should be Magnus, not Morong, but the argument concerning this is a little more involved than under *N. guadalupensis.* The binomial, *N. gracillima,* appears several times in the text of the "Beiträge zur Kentniss der Gattung Najas L." It occurs on p. 20, 23 and 24, but the bibliographical details for the basinym, necessary for valid publication, are lacking from those pages. On page vi, however, the necessary details for the basinym are available: "3) *Najas indica* var. *gracillima* Braun Msc. ist beschrieben in Manual of the botany of the northern United States by Asa Gray. Fifth Edition. New York 1868. pag. 681 in den Addenda." The explanation for recognition of *N. gracillima* as a species is given on page 24. My conclusion, reached in January, 1941, and maintained until now, is that credit for the combination *N. gracillima* (A. Br.) should be given to Magnus, since the name occurs several times in his text and since he clearly argues that the species is specifically distinct from *N. indica.* The citation and reference should be *N. gracillima* (A. Br.) Magnus, Beitr. kennt. Gatt. *Najas,* p. 20 (1870).

In summary, three species of *Najas* are known from Virginia. These are *N. gracillima, N. guadalupensis* and *N. Muenscheri. N. flexilis* may occur, but unquestionable specimens have not yet come to my attention.

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W. Stokes

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PLANTS NEW TO THE FLORA OF THE ISLANDS OF SAINT-PIERRE ET MIQUELON

Brother Louis Arsène

This short paper is intended to be a Supplement to my CONTRIBUTION TO THE FLORA OF THE ISLANDS OF SAINT-PIERRE ET MIQUELON published in Rhodora during the year 1927 (Vol. xxix, July to October).

Since that publication, the French Archipelago to the south of Newfoundland was thoroughly explored by a keen observer, Mr. Mathurin Le Hors, who has been, for more than thirty years, a resident in the country. He assiduously studied botanically not only the small Island of Saint-Pierre, but every corner of Great Miquelon and Langlade, which I had not the possibility of visiting in detail. He was helped in his botanical work by Father Le Gallo, a member of the Order of the Holy Ghost, to whom also we owe many discoveries. Fr. Le Gallo is now at Lac au Saumon, on the Gaspé Peninsula; his somewhat detailed account of the French Islands and their flora is appearing in Le Naturaliste Canadien of this year (Vol. lxxiv).

Mr. Le Hors and Fr. Le Gallo found about 150 species not reported by their predecessors: 124 native and 26 introduced. Specimens of these plants were, from 1931 to 1946, sent to me by Mr. Le Hors, and we submitted nearly all of them, specially the critical ones, to Professor Fernald of Harvard University, the well known specialist on the Newfoundland flora. A number of novelties were sent, for determination, by Mr. Le Hors himself, to Dr. Svenson of the Brooklyn Botanical Garden, or to the late

Bro. Marie-Victorin and his associates, of the University of Montreal.

In the following list are to be found all the species new to the Islands, with the indication of the localities where they were seen or collected and the date and place of the first collection. The names of introduced species are in italics.[1] All the particulars about the plants were given to me by Mr. Le Hors, after his own observations or those of Fr. Le Gallo; I contented myself with putting his notes in order or repeating them.

Enumeration of the Novelties of Mr. Le Hors and Fr. Le Gallo

1. Thelypteris palustris Schott, var. pubescens (Lawson) Fern. Swamps. R. Miquelon: Ruisseau de la Carcasse, Pointe au Cheval; Plaine des Terres Grasses, 27. VII. '37.

Osmunda regalis L., reported by Gautier, was rediscovered by Mr. Le Hors who found two colonies of that plant (var. spectabilis (Willd.) Gray): one at the Chapeau de Miquelon and the other at Cap à l'Aigle, St.-Pierre.

2. Botrychium lanceolatum (Gmel.) Ångstr. Open places, along maritime shores. R. Langlade: between Petit Barachois and Grand Barachois. Miquelon: west shore as far as the sandy plain near the Village, where it is common; Phare de Miquelon 17. VII. '37.

3. Botrychium minganense Vict. Same localities. Plaine de Miquelon, 4. VIII. '39.

4. Botrychium Lunaria (L.) Sw. Same localities. Plaine de Miquelon, 4. VIII. '39.

5. Botrychium matricariaefolium A. Br. Same localities. Isthmus of Langlade, 24. VII. '43.

These four Botrychia often grow together on the maritime dunes and shingle banks.

6. Lycopodium complanatum L., var. canadense Vict. Peaty and woody places. R. Saint-Pierre: Anse à Dinant and Cap au Diable; Cap à l'Aigle, 25. VI. '36.

7. Selaginella selaginoides (L.) Link. Wet places, among mosses. RR. Miquelon: swamps south of Grand Etang; Beaumont, 6. VII. '35.

8. Isoetes macrospora Durieu. Gravelly margins of ponds and streams. C. Saint-Pierre: Etang de Richepomme. Langlade: Voiles Blanches, 5. IX. '35.

[1] The abbreviation C. stands for *common;* CC., for *very common;* R., for *rare;* and RR., for *very rare.*

9. Isoetes Braunii Durieu. Muddy water, in ponds near the sea. C. Saint-Pierre: Etang de Savoyard. Miquelon: Etang du Cap Vert, 26. VII. '37.

10. Sparganium hyperboreum Laestad. Peaty margins of ponds. R. Saint-Pierre: Vallée de la Vigie. Langlade: small ponds of the high plain at Cap au Voleur. Miquelon: Cap de Miquelon; Coromandière, 12. VII. '36.

11. Sparganium chlorocarpum Rydb., var. acaule (Beeby) Fern. Borders of ponds, sometimes out of water. R. Saint-Pierre: Etang de Savoyard. Miquelon: Pointe au Cheval, 17. VII. '36.

12. Sparganium multipedunculatum (Morong) Rydberg. Borders of ponds. R. Saint-Pierre: Presqu'île du Diamant. Langlade: ponds of the Isthmus, 24. VII. '43.

This species has been found on the Avalon Peninsula and the Bay of Islands, Newfoundland. See Rhodora xxv, 131 (1933).

Sparganium americanum Nuttall, reported by de la Pylaie & Gautier, was found by Mr. Le Hors at Anse à Ravenel (Saint-Pierre) and Chapeau de Miquelon.

13. Potamogeton Oakesianus Robbins. Ponds and quiet brooks. C. Miquelon: Plaine du Chapeau, 6. VII. '35.

14. Potamogeton confervoides Reichenb. Shallow water. R. Saint-Pierre: Anse à Pierre. Miquelon: Ruisseau des Godiches, 20. VII. '36.

Very interesting: a preglacial relic growing in New England, Nova Scotia and Newfoundland.

15. Potamogeton pectinatus L. Brackish water. R. Miquelon: Grand Barachois. Isthmus of Langlade, 27. VII. '45.

16. Triglochin palustris L. Brackish water and bogs. R. Miquelon: Pointe au Cheval. Saint-Pierre: Savoyard; Pointe Blanche, 10. VII. '36.

17. Panicum boreale Nash. Moist open ground. RR. Miquelon: Cabanes de l'Ouest; Phare de Miquelon, 12. VII. '40.

18. Muhlenbergia uniflora (Muhl.) Fern., var. terrae-novae Fern. Peaty or muddy borders of ponds; swamps. R. Miquelon: bogs of Beaumont. Saint-Pierre: Pointe Blanche, with *Xyris montana;* Etang du Fauteuil, 2. IX. '37.

19. Muhlenbergia glomerata (Willd.) Trin., var. cinnoides (Link) F. J. Hermann. Low ground. R. Saint-Pierre: bog on the heights of Cap au Basque, 3. IX. '46.

20. Brachyelytrum erectum (Schreb.) Beauv. Dry rocky woods. R. Langlade: wooded valleys in the South of the Island. Miquelon: Terres-Grasses; Ruisseau Sylvain, 29. VII. '37.

Phleum alpinum L., reported by de la Pylaie, was rediscovered by Mr. Le Hors in 1946 at Cap au Voleur, Langlade.

21. Agrostis canina L. Mossy and peaty places. R. Saint-Pierre: Anse à Pierre, 21. IX. '45. Seems to be indigenous. Very interesting find, not quite unexpected. See Rhodora xxix, 126 (1927).

22. Agrostis tenuis Sibth. Low ground. R. Saint-Pierre: Anse à Pierre, 21. IX. '45.

Very likely native, as the preceding species. Two forms of this species occur with the type: a) var. sylvatica (Huds.) With., in which the floral parts are very large (Anse à Pierre, 21. IX. '45); b) var. pumila (L.) Druce, in which the whole plant is dwarfed (Cap de Miquelon, 2. VIII. '42).

23. Agrostis scabra Willd., forma Tuckermani Fern. Gravelly silicious soil. C. Miquelon: Plaine du Chapeau. Saint-Pierre: Savoyard, 12. VIII. '34.

24. Calamagrostis inexpansa Vasey, var. robusta (Vasey) Stebbins. Low ground; borders of ponds and streams. R. Saint-Pierre: Etang du Goéland. Miquelon: Le Cap. Langlade: Pointe Plate, 12. VIII. '34.

Cordilleran plant occurring in W. Newfoundland, Gaspé Peninsula, Anticosti & Mingan Islands.

25. Trisetum spicatum (L.) Richt., var. pilosiglume Fern. Alluvial banks or rocky borders of streams. R. Miquelon: Le Cap. Langlade: Dolisie Valley, 30. VIII. '38.

26. Sieglingia decumbens (L.) Kuntze. Grassy plains and slopes. C. Saint-Pierre: Savoyard, 6. VIII. '34.

This plant seems to be indigenous on Saint-Pierre et Miquelon as it is on the Avalon Peninsula of Newfoundland.

27. Molinia caerulea L. Boggy plains. R. Saint-Pierre: Ruisseau Courval, Cap Noir; Cap à l'Aigle, 31. VIII. '31. Not found on the other Islands.

De la Pylaie considered it as native on the West Coast of Newfoundland. It has not been rediscovered as yet in Newfoundland; its presence on Saint-Pierre et Miquelon is very interesting. It is found at Louisbourg, C. B. See Rhodora xxxv, 137 (1933) and xliv, 335 (1942).

28. Catabrosa aquatica (L.) Beauv., var. laurentiana Fern. Shallow water; borders of ponds. R. Saint-Pierre: Etang Gauthier, 12. VIII. '45. Mr. Le Hors thinks it is native.

29. Poa annua L., var. reptans Hausskn. Waste places; cultivated ground. R. Saint-Pierre: gardens in the Town; Savoyard, 20. V. '45. Introduced from Europe.

30. Poa compressa L. Waste places. Casual. Saint-Pierre: Propriété Clément; Rond-Point, 16. IX. '42.

31. Poa alsodes Gray. Woods. RR. Langlade: Maquine, 24. VII. '45.

32. Poa palustris L. Wet ground. R. Miquelon: Terres Grasses; Plaine du Chapeau, 14. VII. '40. Very likely native.

Poa trivialis L., reported only by Gautier, was found by Mr. Le Hors in the southern part of Langlade far from any dwelling place.

It seems to be indigenous. See the opinion of Professor Fernald about the same plant found by him in Nova Scotia and Newfoundland: Rhodora xxiii, 231 (1921).

33. Glyceria grandis Wats. Borders of streams; ponds. R. Saint-Pierre: Etang Hérault, 5. VIII. '37. Perhaps introduced from the American Continent.

34. Glyceria fluitans (L.) R. Br. Shallow water, borders of streams. R. Saint-Pierre: road to Anse à Pierre, 20. IX. '45. Seems to be native.

35. Puccinellia distans (L.) Parl. Salt marshes; sands of the sea coast. R. Saint-Pierre: Pont Boulo, 16. VIII. '45. Very likely introduced from Europe.

36. Agropyron repens (L.) Beauv., forma trichorrachis Rohlena. Sandy or gravelly shores. R. Miquelon: Pointe au Cheval, 19. VIII. '40.

The type, which was reported by Delamare, is common in waste places, sandy or boggy plains and along the coast in the three Islands. Langlade: Belle Rivière and on the Isthmus. Miquelon: plaine du Chapeau. Saint-Pierre: Cap à l'Aigle.

The plant sent by me to the Gray Herbarium in 1926 and included in the general list of Saint-Pierre et Miquelon plants published in Rhodora xxix, 207 (1927), as typical *A. repens* is *Agrop. repens*, var. subulatum Reichenb. See Rhodora xxxv, 185 (1933). It grows on rocky or gravelly beaches.

Several forms of this variety were found by Mr. Le Hors:

a) 37. Forma Vaillantianum (Wulf. & Schreb.) Fern. R. Langlade: Belle Rivière, 9. VIII. '35.

b) 38. Forma heberrachis Fern. R. Miquelon: shore of the Grand Etang. Saint-Pierre: Cap au Basque, 13. VIII. '44.

c) 39. Forma setiferum Fern. R. Miquelon: shore of the Grand Etang, on gravel, 25. VIII. '44.

40. Agropyron trachycaulum (Link) Malte, var. majus (Vasey) Fern. Dry, sandy or gravelly soil. R. Saint-Pierre: Pointe Blanche, 22. VIII. '34.

41. Agropyron trachycaulum (Link) Malte, var. novae-angliae (Scribn.) Fern. Gravelly beaches. R. Miquelon: Le Cap. Saint-Pierre: Anse à Pierre; Pointe Blanche, 22. VIII. '34.

42. Hordeum jubatum L. Waste places and cultivated ground. Rare and probably introduced from Europe or North America. Saint-Pierre: Pont Boulo. Miquelon: garden-weed in several places. Ile aux Marins: well established in that small Island, 27. VIII. '31.

43. Dulichium arundinaceum (L.) Britt. Swamps and borders of ponds. R. Miquelon: plaine du Chapeaü. Langlade: Voiles Blanches; Belle Rivière, 24. VI. '32.

44. Eleocharis palustris (L.) R. & S., var. major Sonder. Borders of ponds, in shallow water. Rare, but found on the three Islands. Saint-Pierre: Etang de Savoyard, 10. IX. '31.

The plant given in Rhodora xxix, 208 (1927) under the name of *Eleoch. palustris* is Eleocharis halophila Fern. & Brackett. See Rhodora xxxi, 72 (1929). It is very common in brackish water on Miquelon & Langlade.

45. Eleocharis elliptica Kunth (*E. capitata* (L.) R. Br., var. *borealis* Svenson). Marshes and gravelly borders of ponds. C. Saint-Pierre: Etang de Savoyard. Langlade: Belle Rivière, 12. VIII. '34.

46. Eleocharis acicularis (L.) R. & S. Muddy borders of sloughs and ponds. R. Saint-Pierre: Etang de Savoyard, 10. IX. '31.

47. Scirpus validus Vahl, var. creber Fern. Shallow water. R. Found only in the southern part of Etang de Mirande (Grande Miquelon), where it covers great spaces, 27. VII. '37.

48. Scirpus atrocinctus Fern. Wet depressions; ponds. R. Saint-Pierre: Etang Hérault, 23. VIII. '40. Perhaps introduced from Nova Scotia.

49. Scirpus atrovirens Muhl., var. georgianus (Harper) Fern. Wet places; borders of ponds. R. Saint-Pierre: Etang Hérault; Etang de la Vigie, 20. IX. '37.

It is hard to say whether it is native or introduced from the American Continent.

50. Eriophorum Scheuchzeri Hoppe. Swamps. RR. Langlade: boggy plains in the centre of the Island; Etang du Goéland, 17. VIII. '39.

An arctic plant growing in Nw. Newfoundland.

51. Eriophorum viridi-carinatum (Engelm.) Fern. Bogs and swamps. C. in the three Islands. Miquelon: Plaine du Chapeau, 7. VIII. '35.

52. Eriophorum tenellum Nutt. Grows in the same localities as the preceding species. C. Saint-Pierre: Etang du Fauteuil, 17. VIII. '35.

53. Eriophorum gracile Roth. Boggy places. Not C. Found only on Saint-Pierre: Pointe Blanche, 7. IX. '42.

54. Rhynchospora fusca (L.) Ait. Swamps and bogs. RR. Found only on Miquelon: Plaine du Chapeau (three small colonies), 7. VIII. '35.

55. Carex scoparia Schkuhr. Wet open places. C. on the three Isles, under two forms: forma moliniformis (Tuckerm.) Kükenth. and forma condensa (Fern.) Kükenth. Langlade: Belle Rivière. Saint-Pierre: Anse à Pierre, 5. IX. '36.

56. Carex Crawfordii Fern. Wet places; sometimes sheltered depressions. Rare, but growing on the three Islands. Langlade: Belle Rivière. Saint-Pierre: Vigie, 4. VIII. '33.

57. Carex Crawfordii Fern., var. vigens Fern. In the same localities as the type, but more frequent. Miquelon: Pointe au Cheval, 8. VIII. '35.

58. Carex hormathodes Fern. Wet places; sometimes in salt marshes. Rather rare, but found on all the Islands. Saint-Pierre: Ruisseau Courval, 30. VIII. '31.

59. Carex Bebbii Olney. Wet depressions. R. Saint-Pierre: Ruisseau Courval, with the preceding species, 30. VIII. '31.

60. Carex gynocrates Wormsk. Boggy plains; swamps. R. Langlade: Cap au Voleur; plain of the South-West; Dolisie Valley, 30. VIII. '38.

61. Carex brunnescens (Pers.) Poir. The type, which grows on the three Islands and is not rare. Open ground; dry rocky places. Saint-Pierre: Savoyard, 14. VIII. '34.

Only the var. sphaerostachya (Tuckerm.) Kükenth. had been reported previously. See Rhodora xxix, 150 (1927). This plant usually grows in shaded places.

62. Carex disperma Dewey. Swamps; wet and mossy woods. R. Langlade: wood near Petit Barachois, 17. VIII. '40.

63. Carex angustior Mackenz. Open wet places. Grows on the three Islands. Not R. Miquelon: Plaine du Chapeau, 23. VII. '36. Langlade: Heights of Anse aux Soldats, 14. VII. '45. This plant was first placed under the name *C. muricata* L.

64. Carex interior Bailey. Swamps and bogs. R. Found only on Langlade: Dolisie Valley, 30. VII. '38.

65. Carex atlantica Bailey. Shady places; wet thickets. R. Langlade: Heights of Anse aux Soldats; wood at Cap aux Morts, 23. VII. '40.

66. Carex diandra Schrank. Boggy plains. RR. Found only in several swamps around the Chapeau de Miquelon, 23. VII. '37.

67. Carex chordorrhiza L. f. Borders of ponds; bogs. R. Langlade: Plaine des Gaules. Miquelon: Pointe au Cheval, 8. VIII. '35.

68. Carex salina Wahlenb. Salt marshes. R. Saint-Pierre: Savoyard, 14. VII. '37.

This is the type. The var. kattegatensis (Fries) Almq. is CC. and extremely variable.

The plant given in Rhodora xxix, 150 (1927) as *C. maritima* Müller is C. paleacea Wahlenb., forma erectiuscula Fern. See Rhodora xliv, 293 (1942).

69. Carex lenticularis Michx. Gravelly or sandy borders of ponds. Not C. Saint-Pierre: Cap au Basque. Langlade: Cap au Voleur. Miquelon: Terres Grasses, 14. VII. '40.

A very good find of Mr. Le Hors is Carex panicea L., not seen as yet in Newfoundland and which is C. in the plain in the South of the Island of Saint-Pierre, especially at Anse à Ravenel and Cap au Basque. Mr. Delamare reported it as C. in Miquelon, but Mr. Le Hors could not find it there. It seems to be native in Saint-Pierre.

70. Carex leptonervia Fern. Open soil and clearings. C. on Miquelon. Not R. on Langlade: Ruisseau Debon; Belle Rivière, 24. VI. '32.

71. Carex flava L. Damp soil. R. Langlade: Belle Rivière. Miquelon: Terres Grasses, 27. VII. '37.

C. lepidocarpa Tausch is more C. Mr. Le Hors found it in Saint-Pierre.

72. Carex capillaris L. Grassy and mossy slopes. R. Miquelon: Le Cap. Saint-Pierre: Savoyard, 31. VII. '38.

73. Carex arctata Boott. Wooded places. RR. Miquelon: Ruisseau Sylvain. Langlade: Ruisseau Debon, 10. VIII. '36.

74. Carex lanuginosa Michx. Open marshy and grassy places. Not R. Miquelon: Plaine du Chapeau. Langlade: Belle Rivière; Ruisseau Debon, 4. VIII. '36. Not found on Saint-Pierre.

75. Carex lasiocarpa Ehrh., var. americana Fern. Bogs and swamps. R. Miquelon: Ruisseau de la Mère Durand, 27. VII. '45.

76. Carex Hostiana DC. The typical var. Borders of streams, marshy plains. R. Found by Mr. Le Hors in the same localities as the var. laurentiana Fern., which is more common. He sent to me specimens from Miquelon, Terres Grasses, collected on the 27th of July, 1937. They were submitted to Prof. Fernald who identified them. See Rhodora xliv, 319 (1942).

77. Carex saxatilis L., var. miliaris (Michx.) Bailey. Borders of ponds; boggy plains. C. Saint-Pierre: Plaine de Savoyard, 10. VIII. '33.

78. Carex saxatilis L., var. rhomalea Fern. Grows in the same localities as the preceding. C. on the three Islands. Miquelon: Le Cap. Saint-Pierre: Savoyard, 10. VIII. '33.

79. Carex vesicaria L., var. Grahami (Boott) Fern. Margins of ponds. RR. Found only on the Isthmus of Langlade: marais Sauveur, 8. VIII. '35.

80. Carex vesicaria L., var. laurentiana Fern. Low ground; grassy plains. R. Langlade: Belle Rivière, 5. IX. '35.

A plant growing also in W. Newfoundland.

81. Xyris montana Ries. Peaty bogs. RR. Saint-Pierre: Pointe Blanche, with *Muhlenbergia uniflora*, var. *terrae-novae*. Miquelon: several colonies on the plain S. of the Chapeau, 7. VIII. '39.

A southern plant growing in Newfoundland with arctic species.

82. Juncus Gerardi Loisel. Brackish soil; salt marshes. R. Ile aux Marins, in several places. Saint-Pierre: Pointe Blanche, 27. IX. '36.

Juncus trifidus L., reported by Gautier, was found by Mr. Le Hors on several summits of Saint-Pierre and of Miquelon, but not in Langlade.

83. Juncus tenuis Willd. Dry ground; waste places & roadsides. Not R. in Saint-Pierre in the vicinity of the Town: Pointe Blanche, 10. VIII. 31. Not found in Miquelon or Langlade. Perhaps introduced from the American Continent, or even from Europe.

Juncus effusus L., var. Pylaei (Laharpe) Fern. & Wieg., reported only by Gautier, was found by Mr. Le Hors in a good number of localities on the three Islands, especially at LaVigie, Saint-Pierre. It is just as C. as the var. conglomeratus (L.) Engelm., and more C. than the var. solutus Fern. & Wieg.

84. Juncus brevicaudatus (Engelm.) Fern. Wet peat; silicious soil. C. Saint-Pierre: Savoyard, 2. IX. 31.

Mr. Le Hors found on the heights of Anse à Pierre (Saint-Pierre) *Juncus canadensis* J. Gay, reported by Gautier. His specimens were put under the var. sparsiflorus Fern.

85. Juncus pelocarpus Meyer. Muddy or sandy borders of brooks and ponds. R. Saint-Pierre: Anse à Ravenel, Pointe Blanche; Anse à Pierre, 6. VII. '36. A proliferous plant.

86. Juncus bulbosus L., var. fluitans Fries. Margins of pools and ponds. Rarer than the type. Very often proliferous. Saint-Pierre: Anse à Ravenel, Anse à Pierre. Langlade: Voiles Blanches, 27. IX. '36.

87. Juncus militaris Bigel. Borders of ponds; shallow or deep water. R. Saint-Pierre: Anse à Ravenel, Pointe Blanche. Miquelon: Etang des Joncs; le Chapeau, 7. VIII. '35.

88. Juncus articulatus L., var. stolonifer Asch. & Graebn. Wet ground. Much less common than the var. *obtusatus* Engelm., reported previously. Saint-Pierre: Anse à Pierre. Miquelon: Terres Grasses. Langlade: Ruisseau Debon, 4. VIII. '36.

89. Juncus acutiflorus Ehrh. Found in only one locality, on Langlade, near the Governor's House.

There it forms a colony excluding any other vegetation, except a few shrubs on which it leans. In the spaces between the isolated shrubs, the plant is decumbent. It is rather stouter than in Europe, the stem being more than three feet, often four feet high. See Rhodora xliv, 311 & 312 (1944). Collected for the first time on the 23rd of July, 1940.

90. Luzula spicata DC. Gravelly slopes and cliffs. RR. Found only at the Cap de Miquelon, 22. VII. '42. In the same habitat as *Carex scirpoidea* Michx.

91. Trillium cernuum L. Moist thickets and woods. R. Langlade: Dolisie Valley; Belle Rivière, 24. VI. '41.

92. Cypripedium parviflorum Salisb. Swamps and boggy plains. R. Langlade: Heights from Tête Pelée to Cap aux Morts; Ruisseau des Mâts, 23. VII. '40.

It is very doubtful whether this is the plant reported by Gautier under the name of *C. spectabile*. Mr. Le Hors is of the opinion that he rather had in view *C. acaule* Ait.

93. Salix planifolia Pursh. Wet soil. R. Langlade: banks of Belle Rivière, near the sea, 10. VIII. '34.

94. Salix pellita Anderss. Swamps. RR. A few bushes in Dolisie Valley, Langlade, 30. VIII. '38.

95. Salix candida Flügge. Swamps. RR. With the preceding species, in Dolisie Valley, Langlade, 5. VIII. '40. Not found elsewhere.

96. Salix cordifolia Pursh, var. callicarpaea (Trautv.) Fern. Damp ground. R. Cap de Miquelon, 2. VIII. '36.

The St.-P. et Miquelon *Salices*, with the exception of *S. Uva-ursi* Pursh, are rare and very much localized. Seven species are reported as growing on the Islands.

Mr. Le Hors says that Betula terrae-novae Fern. (*B. Michauxii* Spach, in part only), reported by de la Pylaie and Gautier, is common in bogs. It abounds in Newfoundland.

97. Rumex fenestratus Greene (*R. occidentalis* of e. Am. botanists, not S. Wats.). Brackish soil; salt marshes. R.

SAINT-PIERRE: Etang de Savoyard & Etang du Cap Noir. MIQUELON: Cap Vert. LANGLADE: Belle Rivière, 23. VII. '40.

98. RUMEX ORBICULATUS Gray (*R. Britannica* of Am. botanists, not L.). Borders of ponds; wet (sometimes brackish) places. R. SAINT-PIERRE: Etangs du Cap Noir & de Savoyard, with the preceding species. LANGLADE: Sources du Ruisseau Gniachi, 18. VIII. '40.

Mr. Le Hors saw *Polygonum natans*, forma *Hartwrightii* Stanford flowering abundantly far from any water in the sands of the Buttereaux, LANGLADE.

99. SALICORNIA EUROPAEA L., var. PROSTRATA (Pall.) Fern. R. Salt marshes; brackish shores. R. MIQUELON: Grand Barachois, 30. VII. '37.

Extremely abundant on the south shore of that lake, where it forms, in alternance with *Plantago juncoides*, very extensive carpets.

100. SPERGULARIA RUBRA L. Dry soil; sandy (not maritime) places; waste ground. C. at SAINT-PIERRE and at ILE AUX MARINS. Savoyard (St.-Pierre), 6. IX. '34. Introduced from the American Continent or Europe.

Late in the season, last year (it was the 4th of October, 1946) Mr. Le Hors collected around the Grand Barachois, MIQUELON, *Spergularia canadensis* (Pers.) Don, which, in that locality, is surely native. It grows also at Pont Boulo, SAINT-PIERRE, with *Sp. salina* Presl. It is very likely the plant reported by de la Pylaie as *S. media* Presl.

101. STELLARIA HUMIFUSA Rottb. Salt marshes; brackish soil. Not R. MIQUELON: Grand Barachois. ILE AUX MARINS. SAINT-PIERRE: Pont Boulo; Pointe Blanche, 10. VIII. '36.

102. CERASTIUM ARVENSE L. Dry, rocky soil. R. MIQUELON: Le Cap. SAINT-PIERRE: Route de Savoyard, 26. VI. '36. Seems to be native.

103. RANUNCULUS ABORTIVUS L. Shady banks of brooks. R. LANGLADE: Dolisie; Cap au Voleur, 17. VIII. '39.

NOTE ON THALICTRUM DIOICUM L.—Mr. Le Hors and Father Le Gallo searched in vain, on the three Islands, for THALICTRUM DIOICUM L. not yet reported from east of *Maine* and central *Québec*, except by de la Pylaie and by myself from the Island of SAINT-PIERRE. I found it in the plain near the Harbour, between the Town, Galantry and Anse à Ravenel. Possibly it was only an adventive plant, introduced from New England by the

English & American sailors visiting the Harbour of Saint-Pierre, or by the Acadians coming to the French Colony from the American Continent at the end of the 18th century, and which disappeared during the first years of the present century.

Cochlearia danica L., reported by Gautier, was rediscovered by Mr. Le Hors who found it at the base of the fort built on Ile aux Marins, but failed to see it anywhere else in the colony. Probably introduced by the French fishermen; the plant is very common in Brittany and Normandy.

104. Draba incana L. Dry soil. R. Cap de Miquelon, 18. VII. '45.

105. Coronopus didymus L. Weed introduced from Europe in gardens, waste places, roadsides. R. Saint-Pierre: Pointe aux Canons, 5. VIII. 1910.

106. Cardamine pratensis L. Moist ground, along brooks. R. Saint-Pierre: Savoyard; Pont Boulo, 8. VII. '39. Introduced from Europe or from the American Continent.

Frankenia pulverulenta L. was found in 1936 at Savoyard, Saint-Pierre, by Mr. Le Hors. Mediterranean plant which did not succeed in establishing itself in the Island.

107. Sedum acre L. Rocky places. R. Saint-Pierre: Pointe aux Canons, 16. VIII. '33. Introduced from Europe.

Note on Pyrus americana & Pyrus Arsenii.—In Rhodora xxix, 177 (1927), I stated that the Miquelon plant Pyrus dumosa (Greene) Fern. was named P. americana (Marsh) DC. not only by the local observers but by trained botanists, and I let it be understood that the real P. americana, with small fruits and characteristic lanceolate, taper-pointed leaflets, was not growing on the French Colony. But Mr. Le Hors found it in several places in the three Islands, and he even thinks it is more common than P. dumosa. But it usually grows on low ground or in the inferior parts of hills, P. dumosa reaching the higher parts.

I found P. Arsenii only in one locality, at the foot of the Chapeau de Miquelon, and had no time to study its fructification. Mr. Le Hors saw two colonies of that shrub at the Chapeau and ascertained its presence in a good number of localities on Grande Miquelon and Langlade, but he did not find more than one single specimen on Saint-Pierre Island: it was on the heights of Cap à l'Aigle, near Sept Etangs. He collected fruits on many

of the plants: they are a little smaller than those of P. *dumosa*, and not bright red, but purplish-red. He never saw any fruit on the specimen growing at Sept Etangs; it is a trailing shrub with branches spreading all around the stem and forming a bush from six to eight feet in diameter. One of the colonies at the Chapeau de Miquelon is composed of numerous plants growing together and covering about 250 square feet; they are about 2½ feet high, the tallest not exceeding 3 feet.

PYRUS ARSENII seems to be a natural hybrid between P. DUMOSA and P. ARBUTIFOLIA, var. ATROPURPUREA. As the real P. AMERICANA is growing in Saint-Pierre et Miquelon with P. DUMOSA, it would be interesting to know whether it hybridizes there also with P. ARBUTIFOLIA, var. ATROPURPUREA. The hybrid P. AM. × ARB. V. ATR. (SORBARONIA JACKII Rehder) was found in Nova Scotia. (See Rehder, Manual of Cultivated Trees and Shrubs, p. 382, 2nd Ed. 1940.)

PYRUS DUMOSA is growing on Saint Paul Island, N. S., and the hybrid P. ARSENII is given as frequent there by Perry; but neither P. AMERICANA nor S. JACKII are reported from that Island. See RHODORA xxxiii, 121 (1931).

POTENTILLA ARGENTEA L. was found once by Mr. Le Hors on the border of a street, in the Town of Saint-Pierre; it disappeared entirely. He thinks it was introduced from the American Continent, where it is common.

ALCHEMILLA ALPINA L., reported by me from a single locality, the mouth of Belle Rivière, LANGLADE, has been found by Mr. Le Hors at Voiles Blanches, Ruisseau Debon and les Fourches, on the same Island.

108. ALCHEMILLA VULGARIS L., var. FILICAULIS (Buser) Fern. & Wieg. RR. Moist thickets in Dolisie Valley, LANGLADE, 30. VII. '38.

LUPINUS PERENNIS L., var. OCCIDENTALIS Wats., doubtless introduced from the American Continent, was found at Rond Point and Savoyard, SAINT-PIERRE, but disappeared completely after a few years.

109. TRIFOLIUM AGRARIUM L. Waste places and roadsides. Not C. SAINT-PIERRE: Anse à Pierre Road, 4. IX. '30. Introduced from Europe.

Melilotus alba L. was found in several places on Saint-Pierre, but did not maintain itself.

110. Medicago lupulina L. Waste places. R. and only casual. Saint-Pierre: roadsides in the Town; Cap à l'Aigle, 20. VII. '38. Introduced from Europe.

111. Lotus corniculatus L. Introduced in fields and waste places. R. Saint-Pierre: Cap à l'Aigle, 27. VII. '38.

112. Vicia Cracca L. An introduction from Europe, as the preceding species. R. Saint-Pierre: Rond Point, 30. VII. '36.

113. Callitriche heterophylla Pursh. Ponds and quiet streams. R. Saint-Pierre: Etang Boulo and Etang du Milieu. Langlade: Etang de la Goélette; Etang des Voiles Blanches, 5. IX. '35.

114. Hypericum boreale (Britton) Bicknell. Boggy places; borders of ponds. R. Saint-Pierre: Etang du Fauteuil. Langlade: swamps of the Isthmus. Miquelon: Route du Chapeau, 10. VIII. '31.

115. Elatine minima Nutt. In shallow water. RR. Found only on Saint-Pierre: Etang des Herbiers; Pointe Blanche, 3. IX. '45.

116. Viola lanceolata L. Wet, marshy soil. R. Isthmus of Langlade, 14. VII. '46.

117. Epilobium leptophyllum Raf. (*E. rosmarinifolium* Pursh). Low ground. R. Miquelon: Plain at the bottom of the Anse, 21. VIII. '42. I have not seen specimens of this plant.

Myriophyllum exalbescens Fern. reported by Delamare under the name of *M. spicatum* L., and never seen by me, was found by Mr. Le Hors in several places in Langlade: Belle Rivière, Etang du Goéland.

118. Carum Carvi L. Introduced from Europe in cultivated ground. R. Langlade: near the Governor's House. Saint-Pierre: Meadows at Savoyard, 20. VII. '36.

119. Carum bulbocastanum Koch. Cultivated ground. RR. Saint-Pierre: Propriété Clément, in the shade of trees, 3. VIII. '45. Introduced from France; very likely brought in the soil used as ballast for the fishermen's schooners.

120. Monotropa Hypopitys L. Woods; sometimes open ground. R. Only on Langlade: Maquine, Tête Pelée, Cap à Ross; Dolisie Heights, 30. VII. '38.

Mr. Le Hors found at Ruisseau Debon, Langlade, *Pyrola chlorantha* Sw. reported by Gautier.

121. Calluna vulgaris (L.) Hill. Low ground; sometimes in dry places. R. Probably introduced from Europe. Saint-

PIERRE: Cap à l'Aigle, Pont Boulo; borders of Etang du Cap Noir, 20. IX. '35.

Mr. Le Hors writes: "This Heather blooms very late in the season, after the time of botanical excursions, and when not in bloom, it is easily mistaken for *Empetrum*. It is perhaps on account of all this that it was never reported before." In any case, I feel I have to make amends for my former affirmation that "there was not the least chance of finding it in St-Pierre & Miquelon". Amateur botanists are too often rash and categorical in their judgments!

122. GLAUX MARITIMA L., var. OBTUSIFOLIA Fern. Brackish soil, salt marshes. R. LANGLADE: sand dunes in the S. part of the Isthmus. SAINT-PIERRE: Pointe Blanche, 29. VII. '31.

This plant is, by its oval leaves, remarkably different from the type, as known in Jersey, where it is abundant.

123. GENTIANA ACUTA Michx. Moist ground. R. Cap de MIQUELON, 22. VIII. '44.

124. BARTONIA PANICULATA (Michx.) Muhl., var. IODANDRA (Robins.) Fern. Sphagnous bogs. Not R. SAINT-PIERRE: Savoyard, 1. IX. '31.

125. BARTONIA PANICULATA (Michx.) Muhl., var. SABULONENSIS Fern. Swampy borders of ponds. R. LANGLADE: Voiles Blanches, 5. IX. '35.

126. MYOSOTIS SCORPIOIDES L. Wet ground. R. Not native. SAINT-PIERRE: Cap à l'Aigle; banks of a brook at Savoyard, 18. VIII. '31.

127. SATUREIA VULGARIS (L.) Fritsch (*Clinopodium* L.). Surely native. R. Found only on LANGLADE: woods and thickets of Cap au Voleur Valley, where it is abundant, 17. VIII. '39.

128. LINARIA VULGARIS Mill. Waste places. R. ILE AUX MARINS, 11. VIII. '36. Introduced from Europe.

LINARIA REPENS (L.) Mill., found by Mr. Le Hors near the graveyard of the Town of St-Pierre, did not maintain itself.

129. MIMULUS MOSCHATUS Dougl. Moist ground. R. SAINT-PIERRE: roadside near Cap à l'Aigle, 12. IX. '34. Introduced from the American Continent.

130. DIGITALIS PURPUREA L. Cultivated ground; roadsides. Not R. Introduced from Europe and spreading more and more. SAINT-PIERRE: Cap à l'Aigle, 16. VIII. '34.

131. EUPHRASIA RANDII Robinson. Low ground. C. on the three Islands. SAINT-PIERRE: Savoyard, 25. VIII. '39.

132. LITTORELLA AMERICANA Fern. Gravelly shores, shallow water. R. SAINT-PIERRE: Etang du Cap Noir; étang de Savoyard, 16. VIII. '37.

Galium trifidum L., reported by de la Pylaie, was found by Mr. Le Hors at Plaine du Chapeau, Miquelon, and at Ruisseau Gniachi and Ruisseau de la Goélette, Langlade. It is, of course, a native plant.

Galium verum L. was found by Mr. Le Hors at Cap à l'Aigle, Saint-Pierre. This European plant, very likely introduced from France, has not been seen by him for several years. The same thing is to be said of Galium saxatile L., another European plant which was found at Savoyard and disappeared.

133. Viburnum trilobum Marsh. (*V. americanum* of auth., not Mill.). In woods. RR. Miquelon: Ruisseau Sylvain, 23. VII. '36.

134. Viburnum edule (Michx.) Raf. (*V. pauciflorum* La Pyl.). Woods. R. Langlade: Belle Rivière, Ruisseau Debon, 6. VIII. '40.

135. Eupatorium maculatum L. Moist, wooded ground. R. Langlade: plain between Dolisie and Maquine, 21. VIII. '41. Found by Mr. Bonin.

136. Aster radula Aiton. Until now, only the var. strictus (Pursh) Gray of this species has been reported in Saint-Pierre et Miquelon. Mr. Le Hors found the type at Savoyard, Saint-Pierre, 10. IX. '37. It is much rarer than the variety.

137. Aster novi-belgii L. Moist ground. R. Saint-Pierre: Savoyard, 10. IX. '37.

Variable here as it is elsewhere. Mr. Le Hors sent to me several forms.

138. Aster puniceus L., var. firmus (Nees) T. & G. Woods. Not R. on Langlade: thicket near the Governor's House, 14. IX. '44.

139. Antennaria spathulata Fern. Dry soil. R. Langlade: Belle Rivière, 24. VI. '41.

140. Antennaria neodioica Greene, var. attenuata Fern. Dry, rocky or gravelly soil. R. Miquelon: Le Cap, 22. VII. '42.

141. Gnaphalium sylvaticum L. Dry, open places. R. Miquelon: Le Cap. Saint-Pierre: Cap à l'Aigle; Anse à Pierre road. 21. IX. '34.

142. Matricaria suaveolens (Pursh) Buchenau. Waste places, roadsides. C. Town of Saint-Pierre, 2. IX. '31.

This American weed was very rare in France, especially in Brittany, fifty years ago: it is now seen nearly in every village. Very likely introduced in S. P. & M. from Brittany by the fishermen.

143. Senecio Jacobaea L. Cultivated ground; waste places. C. Saint-Pierre: roadside near the Town, 5. VIII. '30. Introduced from Europe and well established.

144. Senecio aureus L. Wet ground, swamps. R. Found only in Langlade: along the Cap au Voleur brook, Maquine; Dolisie Valley, 7. VIII. '38.

145. Cirsium lanceolatum (L.) Hill. Waste places, roadsides. C. on the three Islands. Saint-Pierre: Savoyard, 3. VIII. '10. Introduced from Europe and thoroughly naturalized.

146. Cirsium palustre (L.) Scop. Moist ground. R. Miquelon: Petit Barachois, 17. VIII. '40. Introduced from Europe.

147. Lactuca spicata (Lam.) Hitchc. Low ground. RR. Langlade: Maquine Valley, 5. VIII. '30.

148. Hieracium floribundum Wimm. & Grab. R. Saint-Pierre: Cap à l'Aigle; Savoyard, 20. VI. 36. Not found in Miquelon & Langlade.

149. Hieracium Pilosella L. R. Saint-Pierre: Cap à l'Aigle, 19. VIII. 40.

150. Hieracium aurantiacum L. R. Saint-Pierre: Cap à l'Aigle, 19. VIII. 40.

These three Hieracia (148, 149 & 150), native from Europe, have been introduced lately and are not yet quite naturalized.

A few Remarks on the Ensemble of the Flora of St.-Pierre et Miquelon

The addition to the flora of St.-P. & M. of the 150 novelties found by Mr. Le Hors modifies in some way the general aspect I had given of it in my study of 1927.

I had stated that 33 species reported by my predecessors had been overlooked by me. Mr. Le Hors rediscovered 14 of them: 4 out of the 8 La Pylaie's plants; 8 out of the 18 Gautier's and 2 out of the 6 Delamare's. I mentioned them in the preceding list in their respective place according to the systematic order adopted in Gray's Manual. He did not find *Poa laxa* reported by Beautemps-Beaupré and not seen by any other botanist.

It is very likely that among the 19 species not confirmed by Mr. Le Hors, a certain number are included in the lists already published, owing to mistakes in identification. This is, for instance, probably the case for *Cypripedium spectabile*, reported by Gautier and reluctantly transferred by me to *C. hirsutum* Mill., but which would have been perhaps better put under *C.*

acaule, the only common species growing in the Islands, and not even mentioned by him. Nevertheless I do not deem necessary to exclude from the general list of plants those unconfirmed species.

Mr. Le Hors and Fr. Le Gallo have added to the known flora:

a) 5 families: *Ophioglossaceae, Selaginellaceae, Isoetaceae, Xyridaceae, Elatinaceae*. The number of families passes from 68 to 73.

b) 30 genera: *Botrychium; Selaginella; Isoetes; Panicum, Muhlenbergia, Brachyelytrum, Trisetum, Sieglingia, Molinia, Catabrosa, Puccinellia, Hordeum; Dulichium; Xyris; Trillium; Salicornia; Draba, Coronopus; Medicago, Lotus; Elatine; Carum; Calluna; Glaux; Linaria, Mimulus, Digitalis; Eupatorium, Antennaria, Lactuca*. The number of genera passes from 229 to 259.

c) 150 species, varieties and forms, of which the complete list has been given above.

The flora of the Islands of Saint-Pierre & Miquelon was given in 1927, as made up of 487 plants, 391 native and 96 introduced. It is now, after the last investigations, to be estimated at 637 plants, 515 native and 122 introduced.

The following table—which gives a synopsis of the flora by families—will show, at a glance, that the greatest number of novelties belong to a few families. With only four of them, we have three-fifths of the total: 26 Gramineae, 38 Cyperaceae, 9 Juncaceae & 16 Compositae: 89 out of 150.

I expected that new observations would add several species to my list of Juncaceae and Compositae, because I had been constrained to neglect a little the study of those two families, but I must confess that I was surprised by the considerable number of new Gramineae and Cyperaceae. Out of the 26 new Gramineae, 4 only are introduced, and the 38 new Cyperaceae are all native. The total number of *Carices* is now 68, more than 1/8 of the whole native flora. It is really a high proportion, only to be explained by the great variety and extent of the wet and aquatic stations in the Islands. I note that 10 of the 26 new *Carices* were found in Saint-Pierre Island.

Synopsis of the Flora by Families

Tabular view giving the number of species, varieties and forms in 1927 & 1946, and the number of novelties, for each family.

	1927	*Nov.*	*1946*		*1927*	*Nov.*	*1946*
Polypodiaceae	9	1	10		281	107	388
Schizaeaceae	1		1	Saxifragaceae	6		6
Osmundaceae	3		3	Rosaceae	27	1	28
Ophioglossaceae	—	4	4	Leguminosae	10	4	14
Equisetaceae	6		6	Oxalidaceae	1		1
Lycopodiaceae	10	1	11	Geraniaceae	1		1
Selaginellaceae	—	1	1	Euphorbiaceae	2		2
Isoetaceae	—	2	2	Callitrichaceae	1	1	2
Taxaceae	1		1	Empetraceae	2		2
Pinaceae	8		8	Aquifoliaceae	2		2
Sparganiaceae	2	3	5	Aceraceae	1		1
Naiadaceae	6	3	9	Balsaminaceae	1		1
Juncaginaceae	1	1	2	Hypericaceae	2	1	3
Gramineae	40	26	66	Elatinaceae	—	1	1
Cyperaceae	55	38	93	Cistaceae	1		1
Lemnaceae	1		1	Violaceae	6	1	7
Eriocaulaceae	1		1	Onagraceae	8	1	9
Xyridaceae	—	1	1	Haloragidaceae	5		5
Juncaceae	18	9	27	Araliaceae	1		1
Liliaceae	7	1	8	Umbelliferae	8	2	10
Iridaceae	3		3	Cornaceae	4		4
Orchidaceae	24	1	25	Ericaceae	26	2	28
Salicaceae	5	4	9	Diapensiaceae	1		1
Myricaceae	2		2	Primulaceae	5	1	6
Betulaceae	8		8	Gentianaceae	4	3	7
Urticaceae	3		3	Convolvulaceae	1		1
Polygonaceae	16	2	18	Boraginaceae	3	1	4
Chenopodiaceae	7	1	8	Labiatae	13	1	14
Caryophyllaceae	16	3	19	Scrophulariaceae	9	4	13
Portulacaceae	1		1	Lentibulariaceae	5		5
Nymphaeaceae	1		1	Orobanchaceae	1		1
Ranunculaceae	9	1	10	Plantaginaceae	3	1	4
Fumariaceae	1		1	Rubiaceae	7		7
Cruciferae	12	3	15	Caprifoliaceae	5	2	7
Sarraceniaceae	1		1	Campanulaceae	1		1
Droseraceae	2		2	Lobeliaceae	1		1
Crassulaceae	1	1	2	Compositae	32	16	48
	281	107	388	Total Number	487	150	637

Highlands, Jersey,
Channel Islands.

Potamogeton tennesseensis new to the Manual Range.—A pondweed collected by Elizabeth Ann Bartholomew of West Virginia University in the shallows of the Ohio River, east side of north end of Wheeling Island at the foot of Kentucky Street, Wheeling, West Virginia, on Sept. 14, 1946, no. 0-844 and Oct. 6, 1946, no. 0-849, proves to be *Potamogeton tennesseensis* Fernald, previously known only from Tennessee. The collections match very well with the type material of the species except that the

submersed leaves average much broader. The range of the W. Va. material is from 0.6 to 2.0 mm. broad with 1 to 3 veins and in extreme shoots to 2.6 mm. broad with 5 veins. Most of these leaves are definitely lacunate, at least along the mid-vein; some being lacunate to the margins. The broader leaves may have the lacunae in a band between the inner lateral veins and such leaves strongly simulate those of *P. epihydrus* Raf. The stipules of the submersed leaves are mostly 1 to 2 cm. long and either completely free from the leaf-blades or adnate at the base. A single branch may exhibit free stipules as well as some that have more than half their length adnate to the leaf. This range of adnation is also found on the type collection of *P. tennesseensis.* Some of the largest floating leaf-blades of the W. Va. material, being 5.5 cm. long and 3.5 cm. broad, are larger than any on the Tenn. collections. In all important diagnostic characters the W. Va. and Tenn. plants agree very well. The fruits appear to be identical; those of the Bartholomew collections have thinner walls but most pondweed species have a wide range of variation in the thickness and hardness of the fruit-wall. Collections from the two states also agree surprisingly well in the anatomy of the stem, having the same stelar pattern, types of cells in the endodermis, and both exhibiting the same wide range of variation in the development of cortical bundles. It appears then that the W. Va. material, with its broader leaves which give it a somewhat different aspect from typical *P. tennesseensis,* is not specifically distinct from that species and the description of *P. tennesseensis* should be enlarged to include it.—E. C. Ogden, University of Maine.

Penstemon gracilis in Indiana.—A few small colonies of this species, growing in rather close proximity, were found by me in low grassy ground on the Wabash Railway in Porter Co., near Garyton, June 24, 1947. I believe there is no other record of this species in Indiana. It is not given for this state in Deam's "Flora of Indiana", nor in Pennell's monograph[1]. Specimens have been sent to the Gray Herbarium.—Edwin D. Hull, Gary, Indiana.

Volume 49, no. 585, consisting of pages 217–236 and plate 1087, was issued 28 August, 1947.

[1] Pennell, Francis W., Scrophulariaceae of Eastern Temperate North America. Acad. Nat. Sci. of Philadelphia. Monograph 1. 1935.

W. S. [illegible]

Rhodora

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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REPORTS ON THE FLORA OF MASSACHUSETTS—IV

The sequence of genera and species in this report is largely the same as that in Hitchcock's Manual of the Grasses of the United States, since most students of the grasses accept this as being more nearly correct in a phylogenetic sense than the sequence used in the seventh edition of Gray's Manual. Unless otherwise noted, explanations of unfamiliar names can be found in Hitchcock's Manual. Changes due to the homonym rule are largely self-explanatory.

The variation in frequency between the species of grasses is probably greater than in any other family. Some families may show a large list of casuals based on a single record each just as in the grasses, but at the other extreme none can compare with the meadow and salt marsh grasses in the sheer extent of area covered and multiplicity of individuals. It has been difficult to estimate the frequency of the less common species, especially where we had to rely on herbarium material since collecting has been much more intensive in some counties than in others.

GRAMINEAE (Grass Family)

BROMUS L. Brome Grass

B. CATHARTICUS Vahl. (*B. unioloides* (Willd.) Raspail). South Boston (RHODORA, xv. 148 (1913)).

B. INERMIS Leyss. Sporadic weed in fields; Sandwich and Hyannisport in Barnstable County.

Forma ARISTATUS (Schur) Fernald in RHODORA, xxxv. 316 (1933). Apparently on the increase; Needham, Hingham and Nantucket in the East, occasional in Worcester County, Enfield and Amherst in Hampshire and Stockbridge in Berkshire.

B. ciliatus L. (*B. ciliatus* var. *denudatus* (Wiegand) Fernald in large part but not as to type; cf. Rhodora, xxxii. 68 (1930)). Thickets and borders of woods; occasional in Middlesex County, becoming rather common in Worcester County and westward.

Var. **intonsus** Fernald in Rhodora, xxxii. 70 (1930). Occasional in Essex and Middlesex Counties and westward.

B. Dudleyi Fernald in Rhodora, xxxii. 63 (1930). Limy or neutral bogs and wet thickets; Sherborn and Hopkinton in Middlesex County and occasional in Worcester County and westward.

B. purgans L. Rocky woods; occasional in the vicinity of Boston and from Worcester County westward.

Forma **laevivaginatus** Wiegand in Rhodora, xxiv. 92 (1922). Same range as the species, but also Boxford in Essex County.

B. latiglumis (Scribn.) Hitchc. (*B. altissimus* Pursh (1814), not Gilib. (1792)). Alluvial banks; Merrimac in Essex County, Sandwich in Barnstable, Mount Toby in Franklin, Hadley and Amherst in Hampshire, Chicopee and Springfield in Hampden and common in Berkshire County.

B. Kalmii Gray. Dry ground; Dorchester in Suffolk County, occasional from western Worcester County westward.

B. brizaeformis Fisch. & Mey. Waste ground; Charlestown and South Boston in Suffolk County and New Bedford in Bristol.

B. secalinus L. Waste ground; frequent throughout.

B. commutatus Schrad. (*B. pratensis* Ehrh. ex Hoffm. (1800) not Lam. (1785)). Waste ground; occasional in the Boston District, and in Bristol, Nantucket, Worcester and Berkshire Counties.

B. mollis L. (*B. hordeaceus* of Manual, not L.; cf. Rhodora, xxxv. 316 (1933)). Fields and waste ground; rare in Essex County, frequent elsewhere in the East, Worcester in Worcester County, Amherst in Hampshire, and frequent in Berkshire County.

Forma leiostachys (Hartm.) Fernald in Rhodora, xxxv. 316 (1933). (*B. hordeaceus* var. *leptostachys* of Manual, not Beck). Salem and East Gloucester in Essex County, Dorchester in Suffolk, Nantucket (Bicknell in Bull. Torr. Bot. Club xliv. 375 (1917)), Worcester.

B. racemosus L. Waste ground; occasional near Boston and in Bristol and Worcester (Jackson, Fl. Worcester Co. 21 (1909)) Counties.

B. japonicus Thunb. Waste ground; Boston.

Var. porrectus Hackel. (Cf. Fernald in Rhodora, xliii. 529 (1941)). Somerville in Middlesex County, Boston in Suffolk and Stoughton in Norfolk.

B. rigidus Roth. (*B. villosus* Forsk. (1775), not Scop. (1772)). Waste places; South Boston (Rhodora, xv. 148 (1913)).

Var. Gussonei (Parl.) Coss. & Dur. Medford in Middlesex County, Boston.

B. sterilis L. Boston, Barnstable, Provincetown and Nantucket in the East.

B. rubens L. In wool waste, North Billerica in Middlesex County, *C. W. Swan,* in 1883.

B. tectorum L. Waste ground; common in the East, occasional in Worcester County and rare westward.

VULPIA K. C. Gmelin

(*Festuca* of Manual in part; cf. Fernald in Rhodora, xlvii. 107 (1945)).

V. octoflora Walt. var. **tenella** (Willd.) Fernald in Rhodora, xlvii. 107 (1945). Dry sterile soil; frequent in the East, occasional in Worcester, Hampshire and Hampden Counties.

V. dertonensis (All.) Volk. South Boston, *C. E. Faxon,* in 1878.

V. myuros L. Dry fields and waste ground; occasional in Middlesex, Suffolk, Bristol, Barnstable, Dukes and Nantucket Counties.

FESTUCA L. Fescue Grass

F. elatior L. Meadows and waste ground; common throughout.

F. obtusa Biehler (Cf. Fernald in Rhodora, xlvii. 199 (1945)). (*F. nutans* Biehler (1807), not Moench. (1794)). Moist rich woods; frequent in the Boston District and westward, but known only from Sandwich and Chilmark in the Southeast.

F. rubra L. (For forms and varieties cf. Rhodora, xxxv. 132 (1933)). Dry sandy soil; frequent in the East and in Worcester and Berkshire Counties, rare in the Connecticut Valley.

Forma **megastachys** (Gaud.) Holmb. Amesbury in Essex County and Boston and Roxbury in Suffolk.

Forma **squarrosa** (Fries) Holmb. (*F. rubra* var. *subvillosa* Mert. & Koch). Dorchester in Suffolk County and Amherst in Hampshire.

Var. **commutata** Gaud. Occasional in the East.

Var. **multiflora** (Hoffm.) Aschers. & Graebn. East Gloucester in Essex County, Shirley in Middlesex, Walpole in Norfolk, Harwich in Barnstable and Petersham in Worcester.

Var. **juncea** (Hackel) Richter. Gay Head in Dukes County, *F. C. Seymour.*

Var. vivipara Norman, Fl. Arct. Norveg. 53 (1893). Railroad embankment, Lexington, Middlesex County, *C. H. Knowlton,* Sept. 20, 1903.

Not to be confused with *F. prolifera* (Piper) Fernald in Rhodora, xxxv. 133 (1933), which does not occur south of northern Maine and New Hampshire.

F. ovina L. Occasional, but not recorded from Dukes County.

Forma **hispidula** (Hackel) Holmb. (*F. ovina* var. *hispidula* Hackel; cf. Fernald in Rhodora, xxxv. 165 (1933)). Occasional in the Boston District and in Plymouth, Nantucket (Bicknell in Bull. Torr. Bot. Club, xliv. 374 (1917)) and Berkshire Counties.

Var. duriuscula (L.) Koch. Reported from Middlesex, Suffolk, Norfolk, Plymouth, Bristol, Barnstable, Dukes, Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 475 (1908)), Worcester and Hampshire Counties.

F. capillata Lam. (*F. ovina* var. *capillata* Hackel; cf. Hubbard in Rhodora, xviii. 235 (1916)). Dry soil; occasional throughout but more frequent in the East and in Worcester County.

SCLEROPOA Griseb.

S. rigida (L.) Griseb. Casual introduction in waste places; Boston, *C. E. Perkins*, in 1878.

PUCCINELLIA Parl.

P. fasciculata (Torr.) Bicknell. (*P. Borreri* (Bab.) Hitchc.; cf. Fernald & Weatherby in Rhodora, xviii. 9 (1916)). Salt marshes; Newbury in Essex County, occasional in Bristol and Barnstable Counties and frequent in Nantucket.

P. maritima (Huds.) Parl. Salt marshes; common along the coast from Essex to Norfolk County, occasional in Barnstable County.

P. distans (L.) Parl. Waste ground, not so clearly halophytic as the other species; Suffolk County and North Adams in Berkshire County.

Var. angustifolia (Blytt) Holmb. in Hartmans Handb. Scand. Fl. ed. 12, i. pt. 2, 216 (1926). (*Glyceria distans* var. *angustifolia* Blytt, Norges Fl. 136 (1861); *G. distans* forma or var. *tenuis* Uechtritz in Crépin, Notes Pl. Rar. Belg. fasc. 5, 229 (1865); *Puccinellia distans* var. *tenuis* (Uechtritz) Fernald & Weatherby in Rhodora, xviii. 5, 12 (1916)). West Lynn, Boston and Nantucket in the East.

P. paupercula (Holm.) Fernald & Weatherby var. **alaskana** (Scribn. & Merrill) Fernald & Weatherby in Rhodora, xviii. 6, 18 (1916). (*P. pumila* (Vasey) Hitchc.; cf. Fernald & Weatherby in Rhodora, xxxvi. 346 (1934)). Salt marshes; rare in Plymouth, Barnstable and Dukes Counties.

GLYCERIA R. Br. MANNA GRASS

G. acutiflora Torr. Swamps, often in shallow water; occasional throughout.

G. borealis (Nash) Batchelder. Swamps or shallow water; occasional from the Boston District westward, becoming common in Berkshire County, known only from Easton in the Southeast.

G. septentrionalis Hitchc. Swamps and shallow water; Lynnfield in Essex County, frequent in the southern half of the Boston District, occasional from Worcester County westward, and in the Southeast in Plymouth, Bristol and Nantucket Counties.

G. fluitans (L.) R. Br. Shallow water; Nantucket, *Nellie F. Flynn*, in 1909.

G. obtusa (Muhl.) Trin. Swamps; frequent in the coastal counties but not reported from Nantucket, West Boylston and Douglas in Worcester County.

G. melicaria (Michx.) Hubbard. (*G. Torreyana* Hitchc.; cf. RHODORA, xiv. 186 (1912)). Swampy woods; Haverhill in Essex County, occasional in southern Worcester County and in the Connecticut Valley, becoming frequent in Berkshire County.

G. canadensis (Michx.) Trin. RATTLESNAKE GRASS. Wet ground; common throughout.

G. laxa Scribn. (Cf. Fernald & Wiegand in RHODORA, xii. 135 (1910)). Wet ground; Everett in Middlesex County, occasional in the Connecticut Valley.

G. striata (Lam.) Hitchc. in Proc. Biol. Soc. Wash. xli. 157 (1928). (*G. nervata* Trin.). FOWL MEADOW GRASS. Wet ground and shallow water; common on the mainland and Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 196 (1908), as *Panicularia nervata*), and Naushon and Chilmark in Dukes County.

Var. **stricta** (Scribn.) Fernald in RHODORA, xxxi. 47 (1929). Occasional in the Boston District and in Worcester and Berkshire Counties.

G. grandis Wats. (*Panicularia americana* (Torr.) MacMillan). REED MEADOW GRASS. Moist ground and shallow water; frequent in the Boston District and Berkshire County, occasional elsewhere but not reported from Plymouth or Dukes County.

G. pallida (Torr.) Trin. Sloughs and shallow water; occasional in the eastern counties, rare westward.

G. Fernaldii (Hitchc.) St. John in RHODORA, xix. 76 (1917). (*G. neogaea* sensu Hitchc. Man. Grass. U. S. 94 (1935), non Steud.; cf. Chase in Am. Journ. Bot. xxiv. 33 (1937)). Wet ground and shallow water; rare in Middlesex, Suffolk, Norfolk, Plymouth, Barnstable, Worcester and Berkshire Counties.

POA L. Meadow Grass. Spear Grass

P. Chapmaniana Scribn. Recently introduced weed; Haverhill in Essex County and Amherst in Hampshire.

P. annua L. Lawns, yards and waste ground; common.

P. compressa L. Canada Blue Grass. Sterile, usually dry soil; common.

P. pratensis L. June Grass, Kentucky Blue Grass. Fields; very common.

P. angustifolia L. (*P. pratensis* of Manual in part; cf. Rhodora, xlviii. 22 (1946)). Apparently much less common than the preceding and in dryer habitats.

P. trivialis L. Moist ground, either open or wooded; occasional at low altitudes.

P. alsodes Gray. Moist woods; Lancaster and Worcester in Worcester County, common in the Connecticut Valley and in Berkshire County.

P. languida Hitchc. (*P. debilis* Torr. (1843), not Thuill. (1799)). Rich woods; Ashby in Middlesex County, occasional in Franklin, Hampden and Berkshire Counties.

P. saltuensis Fernald & Wiegand in Rhodora, xx. 122 (1918). Woodland thickets and recent clearings; occasional in northwestern Middlesex County and from northern Worcester County westward.

P. nemoralis L. Meadows and open woods; occasional in the Boston District and in Berkshire County.

P. palustris L. (*P. triflora* Gilib.; cf. Hubbard in Rhodora, xviii. 235 (1916)). Wet or dry ground; common, but not reported from Plymouth, Dukes or Franklin County.

BRIZA L. Quaking Grass

B. maxima L. Boston, *C. E. Perkins* in 1878 (Rhodora, xv. 144 (1913)).

B. media L. Fields and waste ground; occasional in the Boston District and rare in Worcester, Franklin and Hampshire Counties.

(*B. minor* L. It has not been possible to verify the report of this species in Rhodora, xlviii. 18 (1946) and presumably it was recorded from Massachusetts by error).

DIPLACHNE Beauv.

(*Leptochloa* of Manual in part, cf. Nash in Britton & Brown, Ill. Fl. ed. 2, i. 110, 236 (1913)).

D. uninervia (Presl) Parodi in Univ. Nac. Buenos Aires Rev. Céntr. Estud. xviii. 147 (1925). (*Leptochloa imbricata* Thurb.). Woolen mill waste; North Billerica in Middlesex County, *C. W. Swan* in 1885.

D. maritima Bicknell. (*Leptochloa fascicularis* of Manual in part; cf. Nash in Britton & Brown, Ill. Fl. ed. 2, i. 236, 237 (1913)) Waste ground, Boston, on tidal shores in Dukes County on Naushon, and on Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 195 (1908)).

ERAGROSTIS Beauv.

E. hypnoides (Lam.) BSP. Sandy river banks and lake margins; rare in the Connecticut Valley and Berkshire County.

E. capillaris (L.) Nees. Dry sand and gravel; occasional in the Boston District and in Worcester, Hampshire and Berkshire Counties, Erving in Franklin County.

E. Frankii (Fisch., Mey. & Lall.) Steud. Riverbanks and moist gravelly soil; Amherst in Hampshire County, Springfield in Hampden and Sheffield and Alford in Berkshire.

E. PILOSA (L.) Beauv. (*E. pilosa* of Manual in part; cf. Wiegand in RHODORA, xix. 93 (1917) and Long, xxi. 133 (1919)). Waste ground; Salisbury, Marblehead, and Gloucester in Essex County, Scituate in Plymouth, Eastham in Barnstable, Berlin and Shrewsbury in Worcester, Sunderland in Franklin, Amherst, Hadley and Northampton in Hampshire and Granville in Hampden.

E. pectinacea (Michx.) Nees. (*E. pilosa* of Manual in part, cf. above. *E. Purshii* Schrad., cf. Farwell in Am. Midland Nat. x. 306 (1927)). Open sandy ground and waste places; frequent.

E. MULTICAULIS Steud. (*E. peregrina* Wiegand, cf. Fernald in RHODORA, xlvii. 108 (1945)). Dry gravelly soil and waste places; occasional in the Boston District and in Barnstable, Franklin, Hampshire and Berkshire Counties, frequent in Worcester County.

E. MEGASTACHYA (Koeler) Link. (*E. major* Host., *E. cilianensis* auctt. in part, cf. Ascherson & Graebner, Syn. Mitteleurop. Fl. ii. 371 (1900)). Waste ground; frequent about Boston and Worcester, occasional elsewhere, but not reported from Hampden County.

E. POAEOIDES Beauv. (*E. minor* Host.). Waste ground; rare weed in Middlesex, Suffolk, Norfolk, Dukes, Nantucket, Hampshire and Berkshire Counties.

E. HIRSUTA (Michx.) Nees. Dry soil; recorded from Massachusetts without further locality (Hitchc. Man. Grass. U. S. 158 (1935)).

E. INTERMEDIA Hitchc. Waste land; South Boston, *C. E. Faxon* in 1878.

E. spectabilis (Pursh) Steud. (*E. pectinacea* var. *spectabilis* (Pursh) Gray; cf. Farwell in Am. Midland Nat., x. 306 (1927)). Dry sandy soil; occasional in Middlesex, Suffolk and Barnstable Counties, frequent in Dukes and Nantucket Counties.

Var. **sparsihirsuta** Farwell in Am. Midland Nat. x. 306 (1927). (*E. pectinacea* of Manual). Common in the East and Worcester County, frequent westward.

MOLINIA Schrank

M. caerulea (L.) Moench. Waste land; South Boston, *W. S. Ripley, Jr.*, in 1916.

DISTICHLIS Raf. Spike Grass. Alkali Grass

D. spicata (L.) Greene. Salt marshes; common along the coast.

DACTYLIS L. Orchard Grass

D. glomerata L. Fields, roadsides and waste places; common.

Var. detonsa Fries (Cf. Fernald in Rhodora, xxxv. 137 (1933)). Noted from Middlesex, Suffolk, Plymouth, Nantucket, Worcester, Hampshire and Hampden Counties.

Var. ciliata Peterm. (Cf. above). Noted from the Boston District and Bristol, Barnstable, Dukes, Worcester and Berkshire Counties.

CYNOSURUS L. Dogtail

C. cristatus L. Fields and waste ground; occasional in Boston and vicinity, Worcester in Worcester County, Amherst in Hampshire, Springfield in Hampden and Stockbridge in Berkshire.

PHRAGMITES Trin. Reed

P. communis Trin. var. **Berlandieri** (Fourn.) Fernald in Rhodora, xxxiv. 211 (1932). Pond margins and swamps; near the coast, also Westborough in Worcester County, Monson in Hampden and rare stations in Berkshire.

Var. stolonifera G. F. W. Meyer. (Çf. Hegi, Fl. Mittel-Europa, ed. 2, i. 367 (1936)). South Boston, *K. M. Wiegand* in 1911.

SCHIZACHNE Hack.

S. purpurascens (Torr.) Swallen in Journ. Wash. Acad. Sci. xviii. 204, fig. 1 (1928). (*Melica striata* (Michx.) Hitchc.). Rocky woods; Ashburnham in Worcester County, Bernardston and Sunderland in Franklin, Amherst in Hampshire, and frequent in the valley area of Berkshire County.

TRIODIA R. Br.

T. flava (L.) Smyth. (*Tridens flavus* (L.) Hitchc.). Tall Red Top. Dry fields; rare in Middlesex, Norfolk, Plymouth, Barnstable, Dukes, Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 195 (1908)), Worcester, Franklin and Hampshire Counties.

TRIPLASIS Beauv.

T. purpurea (Walt.) Chapm. Sand Grass. Dry sandy soil; occasional in the Boston District, usually near the coast, frequent in the Southeast.

AGROPYRON Gaertn.

A. repens (L.) Beauv. (For varieties and forms cf. Rhodora, xxxv. 182 (1933)). Couch Grass, Quitch Grass. Fields, waste and cultivated ground; very common throughout.

Forma aristatum (Schum.) Holmb. Occasional in Essex, Plymouth, Barnstable, Dukes, Nantucket, Hampshire and Berkshire Counties, frequent in Worcester County.

Forma trichorrhachis Rohlena. Occasional in Middlesex, Suffolk, Barnstable, Nantucket and Worcester Counties.

Forma pilosum (Scribn.) Fernald. Essex, Suffolk, Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 476 (1908)) and Worcester Counties.

Var. subulatum (Schreb.) Reichenb. Frequent in the Boston District and in Worcester County, rare in Plymouth, Barnstable and Hampshire Counties.

Var. subulatum forma Vaillantianum (Wulf. & Schreb.) Fernald. Found in the Boston District and in Barnstable, Dukes, Nantucket and Berkshire Counties, frequent in Worcester County.

Var. subulatum forma heberhachis Fernald. Andover in Essex County and Sherborn in Middlesex.

Var. subulatum forma setiferum Fernald. Rare in Essex, Suffolk, Norfolk, Dukes, Nantucket and Worcester Counties.

A. pungens (Pers.) R. & S. Beaches or salt marsh; along the coast in Ipswich, Gloucester, Boston, Cohasset and Scituate, and frequent in Barnstable County.

A. trichophorum (Link) Richt. Lynn in Essex County (Cf. Hitchc. Man. Grass. U. S. 236 (1935)).

A. trachycaulum (Link) Steud. var. **novae-angliae** (Scribn.) Fernald in Rhodora, xxxv. 174 (1933). (*A. tenerum* in New England of Manual, *A. pauciflorum* (Schwein.) Hitchc.; cf. Fernald in Rhodora, xxxvi. 417 (1934)). Bogs and open rocky woods; rare in Essex, Middlesex, Franklin and Berkshire Counties.

Var. **glaucum** (Pease & Moore) Malte. (*A. caninum* of Manual, cf. Rhodora, xxxv. 177 (1933)). Rare in Middlesex, Norfolk, Franklin, Hampshire and Berkshire Counties.

TRITICUM L.

T. aestivum L. Wheat. Waste ground; occasional escape throughout.

SECALE L. Rye

S. cereale L. Waste ground; occasional escape throughout.

ELYMUS L. WILD-RYE

E. arenarius L. var. **villosus** E. Meyer. (*E. arenarius* of Manual, not L., *E. mollis* Trin.; cf. St. John in RHODORA, xvii. 98 (1915)). Coastal dunes; East Gloucester and Provincetown.

E. villosus Muhl. (*E. striatus* of Manual; cf. RHODORA, xxxv. 194 (1933)). Woods and banks; rare in the Boston District and Hampden County, frequent in Berkshire County.

Forma **arkansanus** (Scribn. & Ball) Fernald in RHODORA, xxxv. 195 (1933). Plum Island in Essex County.

E. canadensis L. (*E. robustus* var. *vestitus* Wiegand; cf. RHODORA, xxxv. 187 (1933)). Dry uplands; occasional in Middlesex, Suffolk, Norfolk, Franklin and Hampden Counties, Somerset in Bristol County.

Forma **glaucifolius** (Muhl.) Fernald in RHODORA, xxxv. 191 (1933). (*E. robustus* Scribn. & Sm., *E. brachystachys* Scribn. & Ball). Recorded from Essex, Middlesex, Norfolk, Bristol, Worcester and Hampden Counties.

E. Wiegandii Fernald in RHODORA, xxxv. 192 (1933). (*E. canadensis* of Wiegand, not L.). Alluvial soil; occasional in the Connecticut Valley and common in the valley area of Berkshire County.

Forma **calvescens** Fernald in RHODORA, xxxv. 192 (1933). Williamstown in Berkshire County, *R. Hoffmann* in 1916.

E. riparius Wiegand in RHODORA, xx. 84 (1918). Riverbanks and low ground; Andover in Essex County, Lancaster in Worcester, occasional in the Connecticut Valley and common in the valley area of Berkshire County.

E. virginicus L. (For varieties and forms cf. RHODORA, xxxv. 197 (1933)). Moist ground; occasional in Essex, Middlesex, Norfolk, Plymouth, Bristol, Barnstable, Dukes and Worcester Counties, Palmer in Hampden County, common in Berkshire County.

Forma **hirsutiglumis** (Scribn.) Fernald. Occasional in Essex, Middlesex, Norfolk, Plymouth, Hampshire, Hampden and Berkshire Counties.

Forma **jejunus** (Ramaley) Bush. Enfield in Hampshire County and Wilbraham and Palmer in Hampden.

Var. **halophilus** (Bicknell) Wiegand in RHODORA, xx. 83 (1918). Brackish marshes and sand; frequent along the coast.

Var. **submuticus** Hook. Chelsea Beach in Revere, Suffolk County, and Cohasset in Norfolk County.

Var. **glabriflorus** (Vasey) Bush. Ayer in Middlesex County, *W. H. Manning* in 1882.

Var. **glabriflorus** forma **australis** (Scribn. & Ball) Fernald. Canton in Norfolk County and Chippaquidick Island in Dukes.

HYSTRIX Moench. Bottle-brush Grass

H. patula Moench. Open usually rocky woods; occasional in the Boston District and westward, becoming frequent in the valley area of Berkshire County.

Var. **Bigeloviana** (Fernald) Deam in Indiana Dept. Conserv. Pub. lxxxii. 117 (1929). (*Asperella Hystrix* var. *Bigeloviana* Fernald in Rhodora, xxiv. 230 (1922)). Occasional in Essex, Middlesex and Suffolk Counties and in the Connecticut Valley, Dalton in Berkshire County.

HORDEUM L. Barley

H. jubatum L. Waste ground and borders of marshes; occasional in the Boston District near the coast, and in Bristol, Dukes, Nantucket, Worcester and Berkshire Counties.

H. nodosum L. Filling; South Boston, *H. A. Young* in 1879.

H. marinum Huds. (*H. maritimum* With.). Waste ground; Boston, *C. E. Perkins* in 1879.

H. murinum L. Waste ground; Dracut, North Chelmsford, Billerica and Lowell in Middlesex County and Boston and Charlestown in Suffolk.

H. vulgare L. Barley. Waste ground; occasional in the Boston District and in Bristol, Nantucket (Bicknell in Bull. Torr. Club, xxxv. 201 (1908)), Franklin and Berkshire Counties.

H. distichon L. Boston, *C. W. Swan* in 1883 (Cf. Rhodora, xv. 150 (1913)).

LOLIUM L. Ryegrass

L. perenne L. Fields and waste ground; frequent in the Boston District and recorded from Barnstable, Dukes, Nantucket Hampshire, Hampden (Andrews, Cat. Springfield, 40 (1924)) and Berkshire Counties.

L. multiflorum Lam. Fields and waste ground; occasional in the Boston District and in Plymouth, Bristol, Nantucket, Worcester, Hampden (Andrews, Cat. Springfield, 40 (1924)) and Berkshire Counties.

Var. diminutum Mutel. (Cf. Weatherby in Rhodora, xix. 121 (1917)). Rare in Essex, Middlesex, Suffolk and Plymouth Counties.

L. temulentum L. Waste ground; Rowley in Essex County, Suffolk County without further locality.

Var. leptochaeton A. Br. (Cf. Fernald in Rhodora, xii. 185 (1910)). Suffolk County, *C. E. Perkins* in 1882.

SPHENOPHOLIS Scribn. Wedgegrass

S. obtusata (Michx.) Scribn. Dry soil; rare in Essex, Suffolk, Nantucket and Hampden Counties.

Var. **lobata** (Trin.) Scribn. Concord in Middlesex County, Milton in Norfolk, Granby in Hampshire and Monson in Hampden.

S. intermedia (Rydb.) Rydb. (*S. pallens* of Manual and var. *major* (Torr.) Scribn., cf. Hitchc. Man. Grass. U. S. 955 (1935)). Meadows and ditches; rare in the Boston District and in Hampshire and Hampden Counties, frequent in the valley area of Berkshire County.

S. nitida (Biehler) Scribn. (Cf. Fernald in Rhodora, xlvii. 198 (1945)). Woods; rare in southern Middlesex and in Norfolk County and in the Connecticut Valley, frequent in the valley area of Berkshire County.

(*S. palustris* (Michx.) Scribn.; cf. *Trisetum pensylvanicum*).

TRISETUM Pers.

T. spicatum (L.) Richter var. **molle** (Michx.) Beal. (*T. spicatum* of Manual in part; cf. Rhodora, xviii. 196 (1916)). Rocky and sandy woods and banks; rare in the Boston District and in Worcester, Franklin, Hampden and Berkshire Counties.

T. FLAVESCENS (L.) Beauv. Rare introduction; Harwich in Barnstable County and from an indefinite locality in the Connecticut Valley (Stone, Pl. Franklin, Hampshire and Hampden Counties, 9 (1913)).

T. pensylvanicum (L.) Beauv. (*Sphenopholis palustris* (Michx.) Scribn.). Swamps and meadows; rare in the Boston District and in Bristol, Barnstable, Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 475 (1908)), Franklin, Hampshire and Hampden (Andrews, Cat. Springfield, 35 (1924)) Counties.

DESCHAMPSIA Beauv. Hairgrass

D. ELONGATA (Hook.) Monroe. Indefinite citation for the state (cf. Rhodora, xxxviii. 266 (1936)).

D. flexuosa (L.) Trin. Dry ground; frequent in the Boston District, common in the Southeast, occasional in Worcester County, Mount Toby in Franklin County, occasional on dry summits in Berkshire County.

D. cespitosa (L.) Beauv. var. **parviflora** (Thuill.) Richter. (*D. caespitosa* of Manual in part, cf. Fernald in Rhodora, xxviii. 153, 154 (1926)). Fields; Worcester in Worcester County, Mount Toby in Franklin and Washington in Berkshire.

Var. **glauca** (Hartm.) Lindm. (*D. caespitosa* of Manual in part, cf. above). Lowell in Middlesex County and Needham in Norfolk.

AIRA L.

A. CARYOPHYLLEA L. Dry fields; locally common in Barnstable and Nantucket Counties.

CORYNEPHORUS Beauv.

C. canescens (L.) Beauv. Sandy field; Edgartown, Dukes County, *E. P. Bicknell* in 1910–13.

AVENA L. Oats

A. fatua L. Waste ground; occasional escape recorded from Middlesex, Suffolk, Norfolk, Hampshire, Hampden and Berkshire Counties.

A. hybrida Koch. Waste ground; Newburyport, Essex County, *E. F. Williams* in 1898.

A. orientalis Schreb. (Characterized by a narrow secund panicle, mostly 2-flowered spikelets and glabrous lemmas). Wharf; Nantucket, *J. R. Churchill* in 1905.

A. sativa L. Waste ground; frequent escape throughout.

A. barbata Brot. (*A. hirsuta* Roth.). Dump, South Boston, *C. W. Swan* in 1886 (Cf. Rhodora, xv. 129 (1913)).

ARRHENATHERUM Beauv. Oat Grass

A. elatius (L.) Beauv. Fields and roadsides; occasional in the Boston District and in Barnstable, Nantucket, Franklin, Hampshire, Hampden and Berkshire Counties, North Attleboro in Bristol County, frequent in Worcester County.

Var. bulbosum (Willd.) Spenner. (Var. *nodosum* (Reichenb.) Hubbard). Plymouth, *S. F. Blake*, no. 3854, in 1912.

Var. bulbosum forma striatum (Hubbard) L. B. Smith.[1] Plymouth, *S. F. Blake*, no. 3855, in 1912.

HOLCUS L.

H. lanatus L. Velvet Grass. Fields and open ground; common in the East, occasional westward.

DANTHONIA Lam. & DC. Oatgrass

D. spicata (L.) Beauv. (Including var. *longipila* auctt. in Rhodora, xxxviii. 266 (1936), not Scribn. & Merrill, cf. Fernald in Rhodora, xlv. 244 (1943)). Dry sterile fields or woods; common.

D. Alleni Austin. (*D. spicata* and *D. compressa* of Manual in part, cf. Fernald in Rhodora, xlv. 239, 240 (1943)). Open shores, rocky or arid openings, clearings and burns; found in the Boston District and Plymouth, Barnstable, Nantucket, Worcester and Berkshire Counties.

[1] Arrhenatherum elatius (L.) Beauv., var. bulbosum (Willd.) Spenner, forma **striatum** (Hubbard) L. B. Smith, comb. nov. *A. elatius* (L.) Beauv., var. *nodosum* (Reichenb.) Hubbard, forma *striatum* Hubbard in Rhodora, xviii. 235 (1916).

D. compressa Austin. Dry open woods; frequent on the mainland, noted on Nantucket.

CALAMAGROSTIS Adans. Reedgrass

(Cf. Stebbins in Rhodora, xxxii. 35 (1930)).

C. canadensis (Michx.) Beauv. Wet places; common.

Var. **Macouniana** (Vasey) Stebbins in Rhodora, xxxii. 41 (1930). (*Deyeuxia Macouniana* Vasey, *Calamagrostis Macouniana* Vasey). Boxford in Essex County and Brewster in Barnstable, and apparently following the Swift River Valley with Dana in Worcester County and New Salem and Wendell in Franklin.

C. cinnoides (Muhl.) Barton. Swamps and wet ground; occasional in the Boston District, becoming more frequent in the Southeast but rare in Dukes County, occasional in Worcester County and the Connecticut Valley (Andrews, Cat. Springfield, 35 (1924)).

C. Pickeringii Gray. Meadows; Andover in Essex County.

Var. **debilis** (Kearney) Fernald & Wiegand in Rhodora, xv. 135 (1913). Andover in Essex County and Wilmington in Middlesex.

C. epigejos (L.) Roth var. georgica (C. Koch) Ledeb. Cf. Fernald in Rhodora, xxxv. 64 (1933). (*C. arenicola* Fernald). Upper edge of salt marsh in Gloucester, Essex County, and opening in sandy woods, Harwich, Barnstable County.

AMMOPHILA Host. Beachgrass

A. breviligulata Fernald in Rhodora, xxii. 71 (1920). (*A. arenaria* of Manual in large part). Dunes and beaches; common along the coast.

AGROSTIS L. Bent Grass

A. spica-venti L. (*Apera spica-venti* (L.) Beauv.). Indicated from Massachusetts on map without citation of locality (Cf. Hitchc. Man. Grass. U. S. 327, fig. 654 (1935)).

A. stolonifera L. (*A. alba* of Manual; cf. Fernald in Rhodora, xxxv. 317 (1933)). Meadows and fields; very common.

Forma **aristigera** Fernald l. c. Granville in Hampden County, *F. C. Seymour*, July 27, 1914.

Var. **palustris** (Huds.) Farwell in Rep. Mich. Acad. Sci. xxi. 351 (1920). (*A. polymorpha* var. *palustris* Huds., *A. alba* var. *maritima* G. Meyer, *A. stolonifera* var. *compacta* Hartm.; cf. Hitchc. Man. Grass. U. S. 783 (1935) under *A. palustris*). Mostly brackish sand; frequent along the coast, occasional in Berkshire County.

A. gigantea Roth. (Distinguished from *A. stolonifera* by its more robust habit, up to 1.5 m. high, its broader leaves, up to 11 mm. wide, its ample diffuse panicle and its mostly aristate lem-

mas; cf. Rouy & Foucaud, Fl. France, xiv. 61 (1913)). Waste land; Boston in Suffolk County and Cambridge in Middlesex.

A. TENUIS L. (*A. alba* var. *vulgaris* (With.) Coss. & Dur.; cf. Hitchc. Man. Grass. U. S. 785 (1935)). Fields and meadows; common.

Forma **aristata** (Parnell) Wiegand in RHODORA, xxvi. 2 (1924). Occasional in the Boston District and in Bristol, Dukes, Nantucket, Worcester, Hampshire and Berkshire Counties.

A. scabra Willd. (*A. hyemalis* of Manual in part, cf. Fernald in RHODORA, xxxv. 207 (1933)). Moist or dry open ground; common.

Forma **Tuckermani** Fernald l. c. Cambridge in Middlesex County and Braintree in Norfolk.

A. hyemalis (Walt.) BSP. (*A. hyemalis* of Manual in part, *A. antecedens* Bicknell; cf. Fernald in RHODORA, xxxv. 208 (1933)). Dry open ground; occasional in Barnstable, Dukes and Nantucket Counties, Worcester and Clinton in Worcester County.

A. perennans (Walt.) Tuckerman. Dry open ground and woods; common on the mainland, Naushon in Dukes County.

Var. **aestivalis** Vasey. (Cf. Fernald in RHODORA, xxxv. 318 (1933)). Common, but not reported from Plymouth, Dukes or Nantucket County.

A. altissima (Walt.) Tuckerman. (*A. perennans* var. *elata* (Pursh) Hitchc.; cf. Fernald in RHODORA, xlix. 109 (1947)). Moist ground, mostly near the coast; occasional in Middlesex and Norfolk Counties and in the Southeast.

A. CANINA L. Meadows and damp ground; occasional in the Boston District, Pelham in Hampshire County.

MIBORA Adans.

M. MINIMA (L.) Desv. Weed in nursery, Plymouth, *B. M. Watson* in 1915 (Cf. Hubbard in RHODORA, xvii. 97 (1915)).

CINNA L. WOODREED

C. arundinacea L. Borders of streams, swamps and wet woods; frequent on the mainland, Chilmark in Dukes County.

C. latifolia (Trev.) Griseb. Moist woods; rare in northern Essex and in Middlesex County, occasional in Worcester, Franklin and Hampshire Counties, and common in Berkshire.

ALOPECURUS L. FOXTAIL

A. MYOSUROIDES Huds. (*A. agrestis* L.). Waste ground; Suffolk County and Lowell in Middlesex County.

A. PRATENSIS L. MEADOW FOXTAIL. Fields and meadows; frequent except in the Southeast where known only from northern Plymouth County and Nantucket.

A. aequalis Sobol. (*A. geniculatus* var. *aristulatus* Torr., cf. Fernald in Rhodora, xxxii. 221 (1930)). Wet ground; occasional in the Boston District and in Worcester, Hampshire and Berkshire Counties.

A. geniculatus L. In water and wet ground; occasional in the Boston District and in Bristol, Barnstable, Nantucket, Worcester (Jackson, Fl. Worcester Co., 17 (1909)) Franklin and Hampden Counties.

POLYPOGON Desf.

P. MONSPELIENSIS (L.) Desf. Waste places; rare in Suffolk County and in northern Middlesex.

PHLEUM L.

P. PRATENSE L. TIMOTHY, HERD'S GRASS. Fields and waste places; very common

Var. NODOSUM (L.) Schreb. (Distinguished by its bulbous-thickened base). Recorded from Essex, Norfolk and Dukes Counties.

GASTRIDIUM Beauv.

G. VENTRICOSUM (Gouan) Schinz & Thell. (*G. australe* Beauv.). In wool waste; Lowell (RHODORA, xv. 127 (1913)) and Billerica in Middlesex County, South Boston.

MUHLENBERGIA Schreb.

M. uniflora (Muhl.) Fernald in RHODORA, xxix. 10 (1927). (*Sporobolus uniflorus* (Muhl.) Scribn. & Merr.). Meadows and bogs; frequent in the East on the mainland but not known from Dukes and Nantucket Counties, frequent in Worcester County, occasional in the Connecticut Valley and in Berkshire County.

M. sobolifera (Muhl.) Trin. Rocky woods and ledges; occasional in Essex, Middlesex, Norfolk, Worcester, Franklin, Hampshire and Hampden Counties.

M. tenuiflora (Willd.) BSP. Rocky woods; rare in Middlesex, Suffolk and Norfolk Counties, New Bedford, (E. W. Hervey, Fl. New Bedford, 90 (1911)) in Bristol, common in Worcester County (Jackson, Fl. Worcester Co., 16 (1909)), occasional in Franklin and Hampshire and frequent at lower altitudes in Berkshire County.

M. glomerata (Willd.) Trin. (*M. racemosa* of Manual, *M. setosa* (Biehler) Trin. ex Hook. f. & Jackson; cf. Hermann in RHODORA, xlviii. 63 (1946)). Meadows and low ground; rare in the Boston District and in Plymouth and Barnstable Counties.

Var. **cinnoides** (Link) Hermann in RHODORA, xlviii. 64 (1946). Rare from Middlesex and Norfolk Counties westward.

M. frondosa (Poir.) Fernald in Rhodora, xlv. 235 (1943). (*M. mexicana* of Manual, not (L.) Trin.). Woods, thickets and waste ground; frequent.

Forma **commutata** (Scribn.) Fernald, l. c. Occasional in Essex, Middlesex, Suffolk, Bristol, Barnstable and Dukes Counties.

M. sylvatica Torr. Moist woods and thickets; occasional in Middlesex, Suffolk, Norfolk and Worcester Counties, common in Franklin and Hampshire and frequent in Berkshire County at lower levels.

Forma **attenuata** (Scribn.) Palmer & Steyermark in Ann. Mo. Bot. Gard. xxii. 467 (1935). Rare in the Boston District and in Hampshire and Berkshire Counties.

Var. **robusta** Fernald in Rhodora, xlv. 236 (1943). Rare in Norfolk, Hampshire and Berkshire Counties.

M. mexicana (L.) Trin. (*M. foliosa* of Manual; cf. Fernald in Rhodora, xlv. 236 (1943)). Moist wooded or open ground; occasional from Essex, Middlesex and Suffolk Counties westward.

Forma **ambigua** (Torr.) Fernald, l. c. Rare in Essex, Middlesex and Worcester Counties.

M. Schreberi G. F. Gmel. Drop-seed, Nimble Will. Damp shady ground; rare to occasional in the Boston District and in Bristol County, Edgartown in Dukes and rare to occasional in Worcester, Hampshire, Hampden (Andrews, Cat. Springfield, 33 (1924)) and Berkshire Counties.

M. capillaris (Lam.) Trin. Hair Grass. Dry exposed ledges; Hingham in Plymouth County, *T. T. Bouve,* no date, and *J. R. Churchill,* Oct. 5, 1887, probably extinct, Mount Holyoke in Hampshire County.

SPOROBOLUS R. Br. Drop-seed

S. vaginiflorus (Torr.) Wood. Dry sterile soil; frequent in the Boston District and occasional elsewhere.

Var. **inaequalis** Fernald in Rhodora, xxxv. 109 (1933). Occasional in Worcester County, Charlemont and Sunderland in Franklin County and Amherst in Hampshire.

S. neglectus Nash. Dry soil; rare in Dukes County and occasional in the valley area of Berkshire.

S. asper (Michx.) Kunth. Dry sandy soil; rare in the Boston District and in Plymouth and Bristol Counties.

S. cryptandrus (Torr.) Gray. Sandy and gravelly soil; occasional in the Boston District chiefly near the coast and in Plymouth County.

HELEOCHLOA Host.

H. schoenoides (L.) Host. Waste ground; South Boston. Dying out, not collected since 1936.

BRACHYELYTRUM Beauv.

B. erectum (Schreb.) Beauv. Moist woods; Blue Hills (Milton or vicinity) in Norfolk County and Pittsfield in Berkshire.

Var. **septentrionale** Babel in Rhodora, xlv. 260 (1943). Occasional in the Boston District, becoming frequent westward and common in Berkshire County, but known only from New Bedford in the Southeast.

MILIUM L.

M. effusum L. Rich woods; Brookfield in Worcester County (Jackson, Fl. Worcester Co., 16 (1909)), Mount Toby in Franklin, Middlefield in Hampshire and Mount Greylock and West Stockbridge in Berkshire.

ORYZOPSIS Michx.

O. pungens (Torr.) Hitchc. Dry sandy woods or fields; frequent in the East on the mainland but not reported from Dukes or Nantucket County, occasional in Worcester County and rare westward.

(*O. canadensis* (Poir.) Torr. (*Stipa canadensis* Poir.).

No Massachusetts material of this species has been found, and it seems likely that all records from the State are due to its confusion with *O. pungens* in such works as the 6th edition of Gray's Manual, the Flora of Essex County and the Flora of Middlesex County).

O. asperifolia Michx. Dry open woods; frequent from the Boston District westward to low levels of Berkshire County, in Southeast known only from North Easton in Bristol County.

O. racemosa (Sm.) Ricker. Dry rocky woods in rich soil; rare in Essex, Middlesex, Norfolk and Worcester Counties, occasional in the Connecticut Valley and frequent in the valley areas of Berkshire County.

STIPA L. Feather Grass

(*S. canadensis* Poir.; cf. *Oryzopsis canadensis*).

S. avenacea L. Black Oat Grass. Dry open woods; rare in the Boston District, occasional in Bristol, Barnstable, Dukes and Nantucket Counties.

ARISTIDA L.

A. tuberculosa Nutt. In sand; rare near the coast in Essex, Middlesex and Suffolk Counties.

A. dichotoma Michx. Dry sandy soil; common in the East, frequent in Worcester County and occasional in the Connecticut Valley, Pittsfield in Berkshire County.

A. OLIGANTHA Michx. Waste land; South Boston in 1878, Northampton in Hampshire County in 1945.

A. longespica Poir. var. **geniculata** (Raf.) Fernald in RHODORA, xxxv. 318 (1933). (*A. gracilis* of Manual in part). Sandy soil; frequent in the East on the mainland, rare in Nantucket County, occasional in Worcester and Amherst in Hampshire.

A. purpurascens Poir. Dry sandy soil; occasional in the East including Bristol County (E. W. Hervey, Fl. New Bedford, 93 (1911)).

TRAGUS Hall.

T. BERTERONIANUS Schult. Flats; South Boston, *C. E. Perkins* in 1882.

LEPTOCHLOA Beauv. SPRANGLETOP

L. FILIFORMIS (Lam.) Beauv. Cotton waste from mills; Lowell and Malden in Middlesex County. Not collected since 1888.

(*L. fascicularis* of Manual; cf. *Diplachne maritima*).

ELEUSINE Gaertn.

E. INDICA (L.) Gaertn. GOOSEGRASS. Waste ground; rare in Essex, Middlesex, Suffolk, Bristol, Worcester (Jackson, Fl. Worcester Co., 18 (1909)), Franklin, Hampshire and Hampden Counties.

DACTYLOCTENIUM Willd.

D. AEGYPTIUM (L.) Richt. Waste ground; Malden in Middlesex County and Worcester City.

CYNODON Rich. BERMUDA GRASS

C. DACTYLON (L.) Pers. Waste ground; Boston, Nantucket, Millbury and Northbridge in Worcester County, Amherst in Hampshire and Springfield (Andrews, Cat. Springfield, 36 (1924)) in Hampden.

SPARTINA Schreb. CORDGRASS

S. pectinata Link. (*S. Michauxiana* Hitchc.; cf. Fernald in RHODORA, xxxv. 258 (1933)). Wet shores and the upper edges of salt marshes, especially near the coast; frequent in the East, Brookfield in Worcester County and Northampton in Hampshire.

Var. **Suttiei** (Farwell) Fernald in RHODORA, xxxv. 260 (1933)). Occasional in the Boston District and in Plymouth County, Brookfield in Worcester County.

S. cynosuroides (L.) Roth var. **polystachya** (Michx.) Beal. (*S. cynosuroides* of Manual in part; cf. Fernald in RHODORA, xlix. 113 (1947)). Upper edges of salt marsh and dry sandy ground beyond; occasional in the western half of Barnstable County, common on Nantucket.

S. alterniflora Loisel. (*S. glabra* Muhl. var. *alterniflora* (Loisel.) Merr.; cf. Fernald in RHODORA, xviii. 177 (1916)). Salt marshes; frequent along the coast.

Var. **pilosa** (Merr.) Fernald in RHODORA, xviii. 179 (1916). Salt marshes; frequent along the coast.

S. patens (Ait.) Muhl. With *Juncus Gerardi* the dominant cover on salt marsh along the coast.

Var. **monogyna** (M. A. Curtis) Fernald in RHODORA, xlix. 114 (1947). (Var. *juncea* (Michx.) Hitchc.). Occasional along the coast.

S. caespitosa A. A. Eaton. (*S. patens* var. *caespitosa* (A. A. Eaton) Hitchc.). Rare in Essex, Plymouth, Barnstable and Dukes Counties.

CHLORIS Sw.

C. VIRGATA Sw. (*C. elegans* HBK.). Waste ground; South Boston in 1882 and Worcester in 1922.

BOUTELOUA Lag. GRAMA

B. RIGIDISETA (Steud.) Hitchc. (*B. texana* Watson). Flats; South Boston, *C. E. Perkins,* Aug. 2, 1882.

B. RADICOSA (Fourn.) Griffiths. Flats; South Boston, *C. E. Perkins,* 1882.

B. GRACILIS (HBK.) Lag. (*B. oligostachya* (Nutt.) Torr.). Waste ground; Danvers in Essex County and South Boston.

HIEROCHLOË R. Br.

H. odorata (L.) Wahlenb. VANILLA GRASS. Damp meadows and fresh or brackish marshes, especially near the coast; frequent in the East including Nantucket (Bicknell in Bull. Torr. Bot. Club, xxxv. 190 (1908) as *Savastana odorata*) but not yet reported from Dukes County, Westboro in Worcester County, rare in the Connecticut Valley to frequent at higher levels in Berkshire County.

ANTHOXANTHUM L.

A. ODORATUM L. SWEET VERNALGRASS. Fields and open ground generally; common.

A. ARISTATUM Boiss. (*A. Puelii* Lecoq & Lamotte). Waste places; rare in Middlesex, Suffolk, Norfolk, Barnstable, Dukes and Hampshire (Stone, Pl. Franklin, Hampshire & Hampden Counties, 8 (1913)) Counties.

PHALARIS L.

P. CANARIENSIS L. CANARY GRASS. Waste places; occasional in the Boston District and in Bristol, Nantucket, Worcester and Hampden Counties.

P. arundinacea L. REED CANARY GRASS. Wet places; frequent in the Boston District and westward, but known only from North Easton, New Bedford and Falmouth in the Southeast.

Forma VARIEGATA (Parn.) Druce, Fl. Berkshire, 556 (1897). (Var. *variegata* Parn., var. *picta* L.). RIBBON GRASS. Waste places as a garden escape; occasional in Essex, Middlesex, Norfolk, Worcester, Franklin, Hampshire and Berkshire Counties.

LEERSIA Sw.

L. oryzoides (L.) Sw. RICE CUTGRASS. Wet places; frequent.

Forma **glabra** A. A. Eaton in RHODORA, v. 118 (1903). Submersed, below tide limit; Newburyport in Essex County, *A. A. Eaton & M. L. Fernald* in 1902.

Forma **inclusa** (Wiesb.) Dörfler in Herb. Norm. cent. lv, lvi. 164 (1915). Cf. Fogg in RHODORA, xxx. 84 (1928). Rare in Essex, Middlesex, Plymouth, Barnstable and Dukes Counties.

L. virginica Willd. Wet woods; occasional in the Boston District and in Worcester County.

Var. **ovata** (Poir.) Fernald in RHODORA, xxxviii. 386 (1936). Occasional in the Boston District, the Connecticut Valley and Berkshire County.

ZIZANIA L. WILD RICE

Z. aquatica L. (Including *Z. palustris* of Manual; cf. Fassett in RHODORA, xxvi. 156 (1924)). Shallow fresh water; frequent in the Boston District, occasional in Plymouth, Barnstable and Nantucket Counties, rare in Worcester and Hampden Counties.

Var. **brevis** Fassett in RHODORA, xxvi. 157 (1924). Fassett indicates specimens from Amesbury and Rowley in Essex County as approaching this variety.

Var. **angustifolia** Hitchc. in RHODORA, viii. 210 (1906). Waquoit in Barnstable County, *H. St. John*, Sept. 5, 1911.

R. C. BEAN
A. S. GOODALE
F. W. GRIGG
S. K. HARRIS
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EQUISETUM PALUSTRE, EXAMPLE OF CARELESS BIBLIOGRAPHY AND PHYTOGRAPHY

M. L. Fernald

Finding myself obliged to learn something, aside from 55 years of field-experience, of the correct names and characters of the more striking vegetative forms of *Equisetum palustre* L. Sp. Pl. 1061 (1753), I have automatically turned to such usually authoritative works as those of Milde, Klinge and Luerssen in Europe, and the supposedly critical work of Marie-Victorin in America. The further I have tried to follow their guidance the deeper I have got into the morass (*palus*) where the species chiefly occurs, or, as my friend, Dr. Arthur Stanley Pease, remarks, in trying to pull the snarls out of a horse-tail I have got into a mare's nest! This is not because of the heterogeneous variation, for the vegetative forms under which the species disguises itself both in Eurasia and North America, can mostly be easily recognized, when one has the fundamental *specific* characters in mind. The difficulties are largely the utter confusion as to the minor categories, so that recent authors, who should know better, cite earlier students as calling variations *formae* when they had not done so, or, still more puzzling, ascribe to authors statements which, apparently, they did not make. A further matter, most difficult to understand, is the separation by Marie-Victorin of the American plants, as distinguished from the Eurasian, on supposed (and illustrated) characters which I am quite incapable of making out.

Discussing first the last of the points above mentioned, in order somewhat to clear the field, we have Marie-Victorin's thesis, in his Équisétinées du Québec, Contrib. Lab. Bot. Univ. Montréal, no. 9: 50–63, figs. 6–13 (1927), that the American plants differ from the Eurasian true *Equisetum palustre* because, he says, the latter has the teeth of the primary (cauline) sheaths "ovate-lanceolate, obtuse, generally shorter than the tube, broadly white-margined (des gaines munies de 6–8 dents ovées-lancéolées obtuses, généralement moins longue que les gaines, largement marginées de blanc)"; whereas the American plant has the teeth longer than the tube of the sheath and narrowly linear-lanceolate, acuminate, acute, with the white margin very

narrow (pp. 50 and 51). This contrast is certainly a most difficult one to find supported by the Eurasian specimens, the descriptions by the most accurate European students and the better European plates. Thus Milde, Mon. Equiset. 325, said: "Zähne breit-lanzettförmig-zugespitzt, breit weisshäutig-gerandet, zum grössten Theile schwarz"; and Luerssen, Die Farnpfl. described the Zähnen as "breit lanzettlichen zugespitzten". Although sometimes in the American specimens the teeth are as long as or longer than the tube of the sheath, the difference is not sufficiently constant to be convincing; similarly, although the white scarious margin is commonly narrower than in most European specimens, broad margins occur in North America and narrow margins in Europe. Altogether, these very trivial differences, too often breaking down on both continents, support the conclusion of the late A. A. Eaton in Fern Bull. ix. 62 (1901) that these "and various other [unstated] minor differences might be noted, but hardly enough to justify its erection into a geographical variety, at least until the differences are found to be constant." Surely the supposed differences emphasized by Marie-Victorin are anything but constant.

The vegetative fluctuations of *Equisetum palustre* are bafflingly numerous and some authors, for instance the very careful Douval-Jouve, Hist. Nat. Equisetum de France, 202 (1864), have asserted that they may arise from the same rhizome and are not recurrent in different years ("Les variations extrêmes de cette espèce n'ont pas assez de permanence pour être citées comme variétés; elle ne persistent pas d'une année à l'autre et on les trouve quelquefois toutes sur un seul et même rhizome"). Everyone in recent years seems to agree that these vegetative forms should be treated as formae, not as true geographic varieties; but they have very generally disregarded the elementary fact that nomenclaturally and taxonomically variations published as varieties cannot be properly ascribed to their original authors as their forms. For instance, one of the most striking of forms is a series of plants, well known to pre-Linnean botanists and very definite in having the numerous strongly ascending branches cone-bearing at tip. This was *E. palustre* "β. Equisetum palustre minus polystachyon. *Bauh. pin.* 16", etc. of L. l. c. (1753). In 1789 in his Hist. Pl. Dauphiné, iii. pt. 2: 835 (1789) Villars had

essentially the same treatment, *E. palustre* L. and "B. *Equisetum minus polystachion.* B[auhin]. *pin.* 16" etc., whereupon Milde, Höheren Sporenpfl. 110 (1865) and in his more extensive Mon. Equiset. 329 (1865) cites in the former *E. palustre*, var. "polystachyum Vill." and in the latter *E. palustre*, var. **"polystachium Vill. hist. pl. Dauph. 1786"** (the date of vol. i, not vol. iii); others, therefore, citing "var. *polystachium* Vill." as published in vol. i, although Villars in vol. iii had, as noted above, merely repeated the polynomial of Bauhin and other early authors, just as Linnaeus had originally done. Apparently the first formal taking up of the tricky name was by Weigel, Fl. Pomerano-Rugica, 187 (1769), where it appeared in proper modern form as *E. palustre*, (B) *polystachion*, with a detailed description. Consequently, following the easy-going technique, it appears in Rouy, Fl. France, xiv. 499 (1913) as var. *polystachyum* (not *polystachion*) Weigel!

Milde, taking up var. *polystachium* as of Villars, who, as just pointed out, merely used the pre-Linnean polynomial phrase, divided it into two forms: "*a*) *Forma corymbosa.* Syn. E. corymbosum Bory. msc. Spicae ramorum in formam corymbi dispositae"; and "*b*) *Forma racemosa.*" Those were clearly designated as *formae.* The International Rules specify without quibble that under each category (species, variety or form) we must use the first name adequately published for the plant in each category, regardless of whether it is antedated by an older name in another category. Luerssen, l. c., cites them as "forma polystachya Villars" (Villars having merely used the old phrase of Bauhin: *Equisetum minus polystachion*) and then ascribed to Milde the "Unterformen" (subforms) **"forma racemosa** Milde" and **"forma corymbosa** Milde", quite regardless of Milde's own treatment. I am aware, as is everyone who has looked into German and Germanic taxonomic treatments of the past (and too often of the present), of the utter confusion there made of the categories and the easy-going freedom with which the groupings of cited authors are distorted. Nevertheless, if the rule that we must take up the first name used within the accepted category is followed, we can only occasionally accept much which purports to be authoritative in continental European bibliography. Without such a rule the confusion would be worse. Most

fortunately, in the case of forma *polystachion* (Weigel), it was properly treated in 1864 as forma *polystachyon* Duval-Jouve, l. c. 247 (1864), and that combination seems to have right-of-way. Incidentally, as shown in the next item, those who work on *Equisetum* would find a treatise of unusual accuracy in the volume by Duval-Jouve.

The discussion of many other such lapses or failures to follow exact bibliographic details in the case of *Equisetum palustre* may be deferred to the comments under the forms at the end of this paper, but two are so typical of the muddy thinking which is too common that they may here be noted. In his detailed paper Marie-Victorin in 1927 sets up as a brand-new variety his *E. palustre*, var. *americanum* (p. 51); then he defines under it some formae, the first of these being "f. **luxurians** n. f. Syn.: *E. palustre* var. *ramosissimum* Peck Rep. N. Y. State Mus. **25:** 107. 1871". Obviously, if Marie-Victorin considered Peck's var. *ramosissimum* (1871) identical with a form of his var. *americanum*, he should have used that name for the variety. Again, Broun, Index N. Am. Ferns, 91 (1938), explicitly stating that true *E. palustre* is "A Eurasian species, represented in North America by: Var. **americanum** Victorin", proceeds on p. 92 to publish **"Var. americanum forma tenue** (Döll) n. comb.", this based on "var. *tenue* Döll, Rhein. Fl. 29. 1843." Quite obviously the name var. *tenue* (1843) antedates by more than three fourths of a century the varietal name given by Victorin and accepted by Broun. Incidentally, if the Eurasian *E. palustre* and its varieties and forms do not occur in America, how does Döll's var. *tenue* from Germany happen to belong under the professedly distinct North American var. *americanum*? Finally, the correct combination, *E. palustre* forma *tenue* (but as *tenuis*, following the very general old custom of making it agree in gender with *forma*) (Döll) Duval-Jouve, l. c. 248 (1864) antedates by 74 years the superfluous combination of Broun.

As I understand the forms of *Equisetum palustre* which have been found in North America, they may be distinguished as follows. It should be said, however, that the weeks of bibliographic research necessary to unsnarl the very confused Old World treatments might lead to the adopting of somewhat different combinations.

a. Stem with whorls or tufts of branches borne regularly from the nodes. . . . *b.*
b. Nodal branches all simple. . . . *c.*
c. Stem erect, with 3–many branches diverging symmetrically as whorls. . . . *d.*
d. Cone borne only from summit of stem. . . . *e.*
e. Branches from median and upper nodes (above submerged-level) strongly arched-ascending to suberect. . . . *f.*
f. Branches 1.5–6 cm. long
Teeth of sheaths white-margined. . . . *E. palustre* (typical).
Teeth blackish, without white margins. . . . forma *nigridens.*
f. Branches 0.7–3 dm. long, very strongly ascending. . . . . forma *verticillatum.*
e. Branches from median and upper nodes horizontally or subhorizontally divergent. . . . . forma *arcuatum.*
d. Cones borne at tips of many ascending branches forma *polystachion.*
c. Stem prostrate, greatly elongate, its elongate (up to 4 dm.) strongly ascending or erect branches mostly in pairs (1–5). . . . . forma *fluitans.*
b. Nodal branches (at least the lower ones) with short branchlets. . . . . forma *ramulosum.*
a. Branches only 1 or 2 (rarely 3) at a node, irregularly scattered, or none.
Main or principal stem elongate, with many nodes, 2–4 mm. thick, with or without more slender secondary stems. . . . . forma *simplex.*
Main axis nearly suppressed, the very numerous slender erect stems or branches nearly uniform and 1–2 mm. thick. . . . . forma *filiforme.*

EQUISETUM PALUSTRE L. Sp. Pl. 1061 (1753); Duval-Jouve, Hist. Nat. Equiset. 246 (1864) with detailed European bibliographic citations; Milde, Mon. Equiset., t. xiii, fig. 4 ("Normale, gewöhnliche Form"). Forma *verticillatum* Milde, forma a. *breviramosum* Klinge in Archiv. Naturk. Liv.-Esth. u. Kurland, ser. 2, viii. 401 (1882); Luerss. Farnpfl. 709 (1889). Var. *americanum* Victorin, Équisét. Quebec, Contrib. Lab. Bot. Univ. Montréal, no. 9: 51 (1927) in part, not the type.

Marie-Victorin, l. c. 50, seems to have misunderstood the Linnaean description, for he there writes: "La diagnose princeps de l'*E. palustre: E. caule angulato, frondibus simplicibus* [with reference to L. Sp. 1061] indique comme type une plante dépourvue de rameaux". Although, according to Victorin, quoting Newman, the material preserved in the Linnaean Herbarium is confused and inadequate, it is evident that by "frondibus", as opposed to "caule", Linnaeus referred to the branches. Note his original description, drawn from his Flora Suecica, of *E. sylvaticum:* "EQUISETUM caule spicato, frondibus compositis", the latter phrase clearly referring to the characteristically much

forked branches. Note also the other references given by Linnaeus for his *E. palustre: E. setis simplicibus internodia vix superantibus* of Royen, Flora Suecica and Dalibard: *E. palustre* of Flora Lapponica, where the Royen phrase-name was given; and Bauhin's *E. palustre, brevioribus setis.* Others of Linnaeus's diagnoses indicate the same meaning of frondibus: *E.* "*arvense* scapo fructificante nudo, sterili frondoso", etc.

Forma NIGRIDENS (St. John) Victorin. Var. *nigridens* St. John, Bot. Expl. Gulf St. Lawr. Reg.—Victoria Mem. Mus. Mem. 126: 42 (1922). Var. *americanum* forma *nigridens* (St. John) Victorin, l. c. 63 (1927).

A local form with the usual white margins of the teeth lacking.

Forma VERTICILLATUM Milde, Gefäss-Cryptog. Schles.—Nov. Act. Acad. Caes. Leopold.-Carol. Nat. Cur. xxvi. 460 (1858). Forma *verticillatum* forma b. *longeramosum* Klinge, l. c. 402 (1882). Forma *longiramosa* Luerss. l. c. 709 (1889). Var. *americanum* Victorin, forma *luxurians* Victorin, l. c. 56, in part (excl. synonym and type).

Milde's forma *verticillatum* was clearly described with "die Aeste in der Mitte des Stengels 2½″-5″ (6.6–14.8 cm.) long, thus coming into the lower range of the form with long ascending branches. Although Milde, with absolute definiteness, published his "*Forma verticillatum*" in 1858, Klinge in 1882 marched in with forma "1. **verticillatum** (f. n.)" and under it "a. **breviramosum** (f. n.)" and "b. **longeramosum** (f. n.)"; and Luerssen, likewise had the two latter forms as "**forma breviramosa** Klinge" and "**forma longiramosa** Klinge" subordinate to "**forma verticillata** Milde". If they intended these and some others as *subforms* they surely did not say so. Forma *longeramosum* was assigned by its author upright ("aufrecht") branches up to 30 cm. long. Forma *verticillatum* (*f. longeramosum*) is the most common form in North America, the specimens before me being twice as numerous as are those of typical *E. palustre.*

Forma ARCUATUM Milde, Gefäss-Cryptog. Schles.—Nov. Act. Acad. Caes. Leopold.-Carol. Nat. Cur. xxvi. 461 (1858). *E. palustre,* 4. *arcuatum* Milde, Höheren Sporenpfl. 109 (1865). Var. *arcuatum* Milde, Mon. Equiset. 328, t. xiii, fig. 1 (1865). Var. *americanum,* f. *luxurians* Victorin, l. c. 56, fig. 11 on p. 59 (1927).

Forma *arcuatum*, relatively infrequent, has the median and upper whorls of branches horizontally or subhorizontally divergent, varying from 0.4–2 dm. or more long, thus being like forma *verticillatum* and typical short-branched *E. palustre* but with wide-spreading branches. The very extreme plant originally described by Milde had the branches arching downward ("bogig herabgekrümmt") and "bis 4" (1 dm.) long. Much of the material cited by Marie-Victorin as his f. *luxurians* is characteristic f. *verticillatum* but the isotype before me and his illustration are f. *arcuatum*. Incidentally, though really important, in setting up his forma *luxurians* Marie-Victorin cited without a word of doubt the var. *ramosissimum* of Peck (see p. 281), but forma *luxurians*, as described, as shown by an isotype and as illustrated with the original publication, has quite simple branches, whereas in Peck's var. *ramosissimum* "the branches are themselves furnished with branchlets." In other words it belongs to forma *ramulosum* Milde. Furthermore, if the author of the newly proposed var. *americanum* (1927) thought that it included var. *ramosissimum* (1871) he should have taken for the variety the first name in that category as conceived by him.

Forma POLYSTACHION (Weigel) Duval-Jouve, Hist. Nat. Equiset. 247 (1864) as f. *polystachyon*. *E. palustre* β. *Equisetum palustre minus polystachyon* L. Sp. Pl. 1061 (1753); Villars, Hist. Pl. Dauph. iii². 835 (1789). *E. palustre*, (B) *polystachion* Weigel, Fl. Pomerano-Rugica, 187 (1769). *E. palustre*, 7. *polystachyum* "Vill." with forma *corymbosa* (Bory ex Milde) and f. *racemosa* Milde, Höheren Sporenpfl. 110 (1865). *E. corymbosum* Bory ex Milde, l. c. (1865). Var. *casuarinaeforme* Schur as syn. ex Milde, l. c. (1865). Var. *polystachium* A. Br. in Am. Journ. Sci. xlvi. 85 (1844); "Vill." ex Milde, Mon. Equiset. 329 (1865) including f. *corymbosa* and f. *racemosa*. Further twists of the bibliography by various later students include such distortions by Klinge as forma "**polystachium** Vill. . . . a. **corymbosum Bory** (als Art)". See p. 280.

A very striking but relatively rare form, comparable with *E. arvense* L., f. *campestre* (C. F. Schultz) Klinge.

Forma FLUITANS Victorin. Var. *americanum*, f. *fluitans* Victorin, l. c. 60, fig. 13 on p. 62 (1927).

The ascending, slender branches, borne unilaterally on the prostrate and sometimes rooting stem, often exceed Marie-Victorin's 5–10 cm. In *Fernald, Long & Fogg*, no. 1185 from

Main River, Bonne Bay, Newfoundland, they reach a length of 3.5 dm.; in A. A. Eaton, no. 42, from Fort Kent, Maine, they are more numerous and up to 4 dm. long.

Forma RAMULOSUM (Milde) Klinge, l. c. 404 (1882), wrongly ascribed to Milde. Forma *ramulosa* Luerss. l. c. 710 (1889), wrongly ascribed to Milde. *E. palustre*, 5. *ramulosum* Milde, Höheren Sproenpfl. 109 (1865). Var. *ramulosum* Milde, Mon. Equiset. 328 (1865). Var. *ramosissimum* Peck, Ann. Rep. N. Y. State Mus. Nat. Hist. 107 (1873). Var. *americanum*, f. *ramosissimum* (Peck) Broun, Index N. Am. Ferns, 92 (1938).

Milde's original brief description, "Aeste unter ihren Scheiden je 1–2 secundäre Aestchen tragend; Stengel sehr schlaff, fast niederliegend," was later expanded in his Monograph where he said the flaccid stem climbed among bushes and was 1½–3 feet tall. Such American specimens as I have seen are smaller: *A. A. Eaton's* no. 130 from Fort Kent, Maine, being only 2.5 dm. high; *Fernald & Long*, no. 12,312 from Fairfield, Maine, slightly more than 4.5 dm. high, with the slightly forking and divergent branches up to 2 dm. long.

Forma SIMPLEX Milde, Gefäss-Crypt. 460 (1858). Var. *tenue* Döll, Rhein. Fl. 29 (1843); Milde, Mon. Equiset. 327, t. xiii. figs. 2 and 3 (1865). Var. *simplicissimum* A. Br. in Am. Journ. Sci. xlvi. 85 (1844). Forma *tenue* (as *is*) (Döll) Duval-Jouve, l. c. 248 (1864). Forma *simplicissima* (A. Br.) Luerss. l. c. 712 (1889), wrongly ascribed to A. Br. Var. *americanum* Victorin, l. c. 51 (1927) in part, including type. Var. *americanum*, forma *tenue* (Döll) Broun, Index N. Am. Ferns, 92 (1928).

Marie-Victorin, having conceived true or typical *Equisetum palustre* L. as the extreme form without branches or with them few, short and irregularly disposed, i. e. forma *simplex*, he logically selected as the type of his var. *americanum* a similar American plant. His description calls for "rami nulli, vel aliter pauci et irregulariter verticillati". The isotype of var. *americanum* in the Gray Herbarium is easily matched by European specimens. The fact that Broun, considering the North American plants distinct from the Eurasian, bases a form of var. *americanum* upon a German type has already been commented on (p. 281).

Forma FILIFORME Lacks. ex Klinge, l. c. 406 (1882). Var. *nanum* Milde, Verhandl. Zool.-bot. Gesellsch. Wien. xiv. 13 (1864), Höheren Sporenpfl. 109 (1865) and Mon. Equiset. 328, t.

xiii, fig. 6 (1865). Forma *nanum* (as *nana*) (Milde) Luerss. l. c. 713 (1889), wrongly ascribed to Milde who had it as a var.

This extreme form, with very many essentially uniform filiform or capillary branches ascending from an abbreviated base was well illustrated by Milde. Klinge, publishing the herbarium-name of Lackschewitz, cited var. *nanum* Milde and especially his figure as the same form. It is well represented by such specimens as *Fernald & Long*, no. 1186 from Main River, Bonne Bay, Newfoundland; *Victorin*, no. 15,038 from Lac St.-Jean, Quebec; *A. A. Eaton*, no. 130, from Fort Kent, Maine; *Fernald & Pease*, no. 16,987 from Errol, New Hampshire.

THE USE OF DDT IN THE PREPARATION OF BOTANICAL SPECIMENS

Richard A. Howard

Botanists who collect plant materials in the tropics are confronted with the problem of protecting their plants from insect attacks while in the press and while in storage, once dry. Specimens are usually collected in large numbers, with reasonable care being taken to remove unsightly specimens or those badly infected with insects. The specimens are then placed between newspaper and dried rapidly over artificial heat or by slower solar heating. When dried, the plant specimens are tied in bundles and kept in a dry place until they can be shipped or brought back to the United States.

The amount of artificial heat used in drying specimens is rarely enough to kill the insects trapped in the flowers or fruits. Thus, during the storage period these insects may continue to destroy the specimen, or insect eggs may have an opportunity to hatch and the larvae feed on the dried plant material. The capacity of many insects in devouring plant specimens is amazing. In a relatively short time all the anthers and pollen, the complete flower, or in certain genera and families even the complete plant will be eaten by infesting or trapped insect pests.

In an attempt to control this insect deterioration of specimens, both in the drying process and while in storage, the author tried various combinations of commercial DDT during several months of collecting in the Dominican Republic last fall. Com-

mercial DDT was purchased from drug and hardware stores and was used in three ways: 1. straight or 100% DDT, powdered, 2. 10% DDT mixed with talc, and 3. 10% DDT mixed with paradichloro-benzene. These products were applied to the specimens by using a large salt shaker or a cardboard box in which holes had been punched. The specimens were arranged on the newspaper and were sprinkled lightly with DDT. Any thick or heavy flowers or fruits were given a larger dosage of DDT than the leaves. Specimens from the special families listed below were also given heavier dosages of DDT. After the specimens were dry and the plants were tied in bundles ready for storage, all sides of the packages were dusted heavily with DDT.

The results of this treatment were very satisfactory. For the first time in the tropics the author was not bothered with insect damage and specimens could be stored in airy and dry rafters or rooms without worry or the need of constant inspection. The results were evident in a short time, since DDT killed most insects within thirty minutes after contact. Specimen sheets showed dead insects and larvae where the animals had crawled from the dusted specimens and died before reaching the edge of the paper. No living insects were found in any of the bundles, and there was no contamination from the outside after three months of storage. In addition, it was found that when sprinkling DDT on the plants while preparing the specimens some of the compound landed on the floor. After the debris was cleaned up, enough DDT was left on the premises to keep the room or camp site free from cockroaches, ants, spiders or scorpions for as long as the camp was used.

Many people still regard the use of DDT as dangerous. It is not if a little care is taken in its use. DDT is not dangerous in small quantities, but it should not be dusted on food or food containers nor should too much be inhaled. I do not know anyone who is allergic to DDT. It will not harm the skin; in fact, during the war it was reportedly used as a dusting powder for body insects.

Once the specimens have arrived at the laboratory or are ready for mounting, most of the powder can be blown freely from the specimens. If a specimen was damp or if heavy application of DDT was necessary, this powder may have caked and can then

be removed with a small paint brush or a camel's hair brush. Any grains of DDT remaining on the specimen will give lasting protection against insects in the herbarium.

It is worth noting that certain families of plants in the tropics are more likely to be infected with insects than others. These same families are more frequently attacked in the herbarium, insects often showing a decided preference for these groups. Included are the following families: Bromeliaceae, Liliaceae, Iridaceae, Zingiberaceae, Orchidaceae, Cruciferae, Capparidaceae, Leguminoseae (particularly Cassia), Malvaceae, Melastomaceae, Onagraceae, Solanaceae, Ericaceae, Asclepiadaceae, Lobeliaceae, and Compositae. Specimens from any of these families should be protected by dusting with DDT when the specimen is prepared in the field.

For my own work 100% DDT is preferred. Only a light dusting is necessary when the worker knows that every particle is effective. That may be wasteful, but DDT is reasonable in price and can be used freely. The mixture of DDT and paradichloro-benzine was used to test the para-dichloro-benzene as a repellent and also as a drying agent. The repellent effect was not evident, since all insects were killed, and the drying effect on such groups as the Orchidaceae and Bromeliaceae was scarcely noticeable.

It is certainly felt that the slight extra effort of applying DDT in the field was worth the peace of mind and the improved specimens free from insect damage.

Society of Fellows, Harvard University.

Vicia Sepium in New Brunswick.—The pretty *Vicia Sepium* L. has been under observation by the writer since 1941. It has definitely established itself here at Grand Falls, N. B. in a waste place along the top of a bank of the Saint John River; and it continues to spread. Older manuals list the plant from Maine, New Hampshire, Quebec and Ontario. Yet Marie-Victorin in his Flore Laurentienne does not mention it. For the Quebec record see H. E. Sargent in Rhodora **2:** 225. 1900. Dr. Fernald also reports it from Nova Scotia in Rhodora **24:** 176. 1922. As a voucher for this record of *Vicia Sepium* from New Brunswick, specimens, *Habeeb*, July 24, 1947, Grand Falls, N. B., have been deposited at the Gray Herbarium.—Herbert Habeeb.

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THE NAME OF THE WILD DILLY OF FLORIDA

Elbert L. Little, Jr.

In recent studies, Gilly (Trop. Woods **73:** 1–22. 1943) and Cronquist (Bull. Torrey Bot. Club **72:** 550–552. 1945) have confirmed the earlier conclusion of Nuttall and Baker that the wild dilly (family *Sapotaceae*) of southern Florida and the Bahama Islands is congeneric with the sapodilla, *Achras Zapota* L., but both have adopted *Manilkara* Adans. for the generic name. For the wild dilly Sargent (Man. Trees No. Amer. Ed. 2, 819. 1922) used *Mimusops emarginata* (L.) Britton, and Sudworth (Check List Forest Trees U. S. 221. 1927) had *Mimusops parvifolia* (Nutt.) Radlk. A check of the nomenclature for the forthcoming Forest Service "Check List of the Native and Naturalized Trees of the United States, including Alaska" reveals that a new combination is needed under either *Achras* or *Manilkara*. After an evaluation of these generic names, a new combination for the wild dilly is proposed here in *Achras*.

Contemporary specialists in the *Sapotaceae* have restricted *Mimusops* L. (Sp. Pl. 349. 1753; Gen. Pl. Ed. 5, 165. 1754) to Asiatic species and have transferred the tropical American species of this genus, as well as others from Africa, Asia, and Oceanica, to the segregate genus *Manilkara* Adans. (Fam. Pl. **2:** 166. 1763). The latter was revived by Dubard (Notul. Syst. **3:** 45–46. 1914; Marseille Mus. Colon. Ann., sér. 3, **3:** 1–62. 1915), who proposed the first binomials in it. Other monographers adopting *Manilkara* include: Lecomte (Notul. Syst. **3:** 336–345. 1918), Lam (Bul. Jard. Bot. Buitenzorg, sér. 3, **7:** 1–289. 1925), and Baehni (Candollea **7:** 394–508. 1938).

For the sapodilla most recent authors have adopted *Achras Zapota* L. (Sp. Pl. 1190. 1753), though *Sapota Achras* Mill. (Gard. Dict. Ed. 8, *Sapota* No. 1. 1768) is used by a few, including Bailey and Bailey (Hortus Second 658. 1941). Cook (Contrib. U. S. Natl. Herb. **16:** 277–285, illus. 1913), Pittier (Contrib. U. S. Natl. Herb. **18:** 76–86, illus. 1914), Gilly, and others have discussed the controversial nomenclature. Gilly showed that *Achras* L. and *Manilkara* Adans. are connected by transitional forms and should be united. However, he adopted *Manilkara* Adans. for the combined genus, made the new combination *Manilkara Zapodilla* (Jacq.) Gilly for the sapodilla, and proposed *M. bahamensis* for the wild dilly. Some additional remarks may be in order.

Achras L. (Sp. Pl. 1190. 1753; Gen. Pl. Ed. 5, 497. 1754) is associated with the reference to Plumier (Nov. Pl. Amer. Gen. 43, pl. 4. 1703), as the genus was based upon Plumier's description and plate (Internat. Rules, Ed. 3, Art. 20, 42). Because Plumier's description was incomplete and did not mention the number of stamens, Linnaeus was unable to classify the genus in his sexual system. In the first five editions of the Genera Plantarum (1737 to 1754), Linnaeus placed this genus in the Appendix, and in the first four of these under "Fragmenta Plumieri". Plumier's figure, which Cook reproduced, contained a seed of sapodilla and fruits generally regarded as sapodilla, but the flower appeared to be different.

The next name, *Sapota* Mill. (Gard. Dict. Abridged. Ed. 4, v. 3. 1754), had a reference to Plumier but none to *Achras* L. and is considered a synonym, though Miller described the sapote instead. Miller first included *Sapota* in a supplementary volume of the Gardeners Dictionary published in 1739. Beginning with the 1759 edition (Miller, Gard. Dict. Ed. 7. 1759), the first cited by Gilly, *Achras* L. appeared as a synonym. In a somewhat later, posthumous edition (Miller, Gard. Bot. Dict. 1807), *Achras* L. finally was adopted.

After 1753 *Achras* was first accepted by Patrick Browne (Civ. Nat. Hist. Jamaica 200–201, pl. 19, fig. 3. 1756), who had eight species but no generic description nor binomial nomenclature. Loefling (Iter Hispan. 186. 1758) emended Plumier's description of the sapodilla under the name *Achras* without binomial

nomenclature. With Loefling's corrected description on the sapodilla, Linnaeus (Syst. Nat. Ed. 10, **2:** 988, 1381. 1759) now published "ACHRAS *emendatione Loeflingii*" and placed the genus in the Hexandria Monogynia, now that the number of stamens was known. This emended generic description in almost the same form appeared in the next edition of the Genera Plantarum (Ed. 6, 173. 1764). Most subsequent authors have accepted *Achras* L. as emended.

Similarly, *Achras Zapota* L. (Sp. Pl. 1190. 1753), published in the appendix as the only species of the genus dating from 1753, has been adopted for the sapodilla by most later authors. Though most of the pre-Linnaean synonyms cited referred to the sapote, *Calocarpum Sapota* (Jacq.) Merr., Linnaeus afterwards emended the descriptions so that *Achras Zapota* L. (Syst. Nat. Ed. 10, **2:** 988. 1759) and *A. Sapota* L. (Sp. Pl. Ed. 2, 470. 1762), a variant spelling, characterized the sapodilla and *A. mammosa* L. (Sp. Pl. Ed. 2, 469. 1762) the sapote.

The Linnaean Herbarium contains two specimens labeled *Achras Sapota*, according to Savage (Catal. Linn. Herb. 64. 1945). However, Jackson (Index Linn. Herb. 1912) indicated that this species was represented in the herbarium in the enumeration in 1767 but not in 1753 and 1755. Examination of the photographs of the Linnaean Herbarium in the Arnold Arboretum confirms that one specimen is the sapodilla, but the other is an unrelated plant, of which the specific epithet had been deleted afterwards by James E. Smith. Though Linnaeus did not have the modern concept of types, the specimen in the Linnaean Herbarium, which may be regarded as representative and as the type of both genus and species, agrees with present usage of the name. In the International Rules, *Achras Zapota*, the single species published in 1753, is listed as the standard species of the genus.

Linnaean names of 1753–1754 must not be rejected without sufficient cause, as they represent the foundation of nomenclature and have priority over all other names. Svenson (Rhodora **47:** 273–302, 363–388, illus. 1945), Fernald (Jour. Arnold Arboretum **27:** 386–394, illus. 1946), and others have noted that many Linnaean species consist of more than one species under present usage and have advocated retention under established custom (Art. 5) of Linnaean names based in part on the element

long accepted as typical. Where Linnaean genera and species represented broader concepts than at present and were composite groups, the original names must be retained for appropriate segregate elements (Art. 51, 52).

Achras L. and *Achras Zapota* L., names for the sapodilla, should not be cast aside merely because the earlier reference by Plumier contained incorrect description and drawings and because the synonyms cited under the species referred mostly to the sapote. *Achras* L., as emended by Loefling and Linnaeus himself, should be retained under Article 50, which states that an alteration of the diagnostic characters of a group does not warrant a change in its name. Gilly's proposals that *Achras* L. (1753) be rejected as a *nomen ambiguum et confusum* (Art. 62, 64) and that *Achras* L. emend. Loefl. (1758) be rejected as a later homonym (Art. 61) seem unnecessary.

If future usage is not uniform, then the problem can be settled easily by making *Achras* L. emend. Loefl. (1758 or 1759) a *nomen conservandum*. Under Article 21 *Achras* L. clearly is eligible for conservation as a name that has come into general use in the fifty years following its publication in 1753 and in important works up to 1890. The first binomial in *Manilkara* Adans. was published in 1914, only 33 years ago and 161 years after *Achras Zapota* L. The forty or more species of *Manilkara*, nearly all transferred from *Mimusops*, can easily be transferred to the older and familiar genus without confusion.

Accordingly, a new combination in *Achras* is proposed below for the wild dilly. Its basonym, incidentally, is one of the two original species of *Sloanea* L. (Sp. Pl. 512. 1753; Gen. Pl. Ed. 5, 288. 1754). This Linnaean genus of *Elaeocarpaceae* cannot be rejected in spite of the fact that one of the two species placed in it by its author is now in the *Sapotaceae*.

Achras **emarginata** (L.) Little, comb. nov. *Sloanea emarginata* L., Sp. Pl. 512. 1753. *Sapota achras* γ. *depressa* A. DC. in DC., Prodr. **8**: 174. 1844. *Achras zapotilla* β *parvifolia* Nutt., No. Amer. Sylva **3**: 28, pl. 90. 1849. *Mimusops Sieberi* [A. DC., sensu] Chapm., Fl. So. U. S. 275. 1860; A. Gray, Syn. Fl. No. Amer. **2** (**1**): 69. 1878; Sargent, Silva No. Amer. **5**: 183, pl. 251. 1893. Non *Mimusops Sieberi* A. DC. in DC., Prodr. **8**: 204. 1844. *Achras Zapotilla* var. *parviflora* Nutt. ex A. Gray, Syn. Fl. No. Amer. **2** (**1**): 69. 1878; pro synon. (error for "*parvifolia*").

Mimusops parviflora Radlk., Sitzber. Bayer. Akad. der Wiss., Math.-Phys. Kl. **12:** 344. 1882. *Achras bahamensis* Baker in Hook., Icon. Pl. **18:** pl. 1795. 1888. *Mimusops floridana* Engl., Engl. Bot. Jahrb. **12:** 524. 1890. *Mimusops parvifolia* Radlk. ex Pierre, Not. Bot. Sapot. 37. 1891; Pierre & Urban, Symb. Antill. **5:** 171. 1904; Britton & Shafer, No. Amer. Trees 782, fig. 714. 1908. Non *Mimusops parvifolia* R. Br., Prodr. Fl. Nov. Holl. **1:** 531. 1810. Non *Mimusops parvifolia* Kurz, Forest Fl. Brit. Burma **2:** 124. 1877. *Mimusops bahamensis* (Baker) Pierre, Not. Bot. Sapot. 37. 1891. *Mimusops depressa* (A. DC.) Pierre, Not. Bot. Sapot. 37. 1891. *Mimusops emarginata* (L.) Britton, Torreya **11:** 129. 1911. *Manilkara parvifolia* (Nutt.) Dubard, Ann. Mus. Col. Marseille, sér. 3, **3:** 16. 1915 [1916?]. Non *Manilkara parvifolia* (Kurz) H. J. Lam, Bul. Jard. Bot. Buitenzorg, sér. 3, **7:** 269. 1925. *Manilkara emarginata* (L.) Britton & Wils., Sci. Surv. Porto Rico **6:** 366. 1926. Non *Manilkara emarginata* H. J. Lam, Bul. Jard. Bot. Buitenzorg, sér. 3, **7:** 241. 1925. *Manilkara bahamensis* (Baker) Lam & Meeuse, Blumea **4:** 351, 354. 1941; Gilly, Rhodora **48:** 164. 1946. *Manilkara emarginata* (L.) Britton & Wils. subsp. *typica* Cronq., Bull. Torrey Bot. Club **72:** 557. 1945. *Manilkara jaimiqui* (Wright) Dubard subsp. *emarginata* (L.) Cronq., Bull. Torrey Bot. Club **73:** 467. 1946.

The wild dilly has an involved nomenclature, as revealed by the detailed synonymy above. It was discovered in the Bahamas by Catesby who published a description with colored plate (Nat. Hist. Carol. Baham. **2:** 87, pl. 87. 1733). *Sloanea emarginata* L. was based upon Catesby's citation and is not represented in the Linnaean Herbarium. Apparently the name was overlooked until 1911, when it was transferred as *Mimusops emarginata* (L.) Britton. Previously, the wild dilly had been included in the West Indian species, *Mimusops Sieberi* A. DC., or designated as *Mimusops parvifolia* Radlk.

Forest Service,
United States Department of Agriculture,
Washington, D. C.

Penstemon gracilis Nutt., var. **wisconsinensis** (Pennell), n. comb. *P. wisconsinensis* Pennell, Mon. Acad. Nat. Sci. Phila. i. 234 (1935). *P. gracilis* [subsp.] *wisconsinensis* Pennell, *l. c.* 632.

This name has been used in the Spring Flora of Wisconsin, 1938 and 1947, but without proper validating synonymy.—N. C. Fassett, University of Wisconsin.

THE VARIETIES OF SOLIDAGO ULIGINOSA

M. L. Fernald

Since it is now evident that the type of *Solidago uliginosa* Nutt. (1834) is identifiable with that of *S. neglecta* Torr. & Gray (1842) —see Cronquist in Rhodora, xlix. 72 (1947)—it becomes necessary to find a name for the northern, often calcicolous species which, following Gray in the Synoptical Flora, has been erroneously passing as *S. uliginosa.* This species is *S. humilis* Pursh (1814), photograph of type before me, not *S. humilius* (corrected *lapsus* for *S. humilis*) Mill. (1768). Apparently its first available name is *S. chrysolepis* Fernald in Ottawa Nat. xix. 168 (1905). The latter, *S. chrysolepis,* is a boreal species of calcareous to mediacid rocky or gravelly soils or marshes[1], occurring from near lat. 60° in northern Labrador to Manitoba, south to Newfoundland, Cape Breton, New Brunswick, northern and western New England, northwestern New Jersey ("Marl bog", Warren County; etc.), northeastern Pennsylvania, central and western New York ("Boggy calcareous meadows"—Wiegand & Eames, Fl. Cayuga L. Basin, 400), mountains of West Virginia (very local: at 2500 ft., east of Gormania, *Svenson,* no. 4449), Ohio, Michigan, Wisconsin and Minnesota. Its fleshy-coriaceous basal leaves are usually entire or merely undulate to crenate (only exceptionally serrate); its inflorescence an elongate thyrse 0.3–4.5 dm. long, with appressed erect cylindric (not secund) branches; heads on pedicels becoming 1–2 cm. long; involucres 4–6 mm. high; disk-florets 9–15.

On the other hand, true *S. uliginosa* (*S. neglecta* Torr. & Gray; *S. uniligulata* (DC.) Porter) is most often an extreme oxylophyte (only one variety definitely calcicolous), occurring in acid bogs and peats as a series of geographic varieties from Delaware and Maryland, very rarely in the upland south to North Carolina,

[1] The following memoranda by the collectors, taken from labels of *Solidago chrysolepis,* are to the point, omitting those from the Straits coast of Newfoundland, Anticosti and Mingan Islands, lower levels of Gaspé, the shores and islands of Lake Mistassini, the foot of James Bay and other exclusively or mostly limestone regions where the species abounds: talus of limestone cliff; rocky limestone barren; sur les tables de calcaire dolomitique des rivages; Arbor-Vitae swamp (usually marly); lime heath; marl bog; and, of course many from "bogs", "sphagnum bogs", etc., for the species tolerates some acidity. Search of field-labels of *S. uliginosa* will reveal few, if any, indicating calcareous soils, and no specimens whatever from the northerly calcareous areas noted above.

northward to central Newfoundland, the Magdalen Islands, southern New Brunswick, central Maine, New Hampshire, Vermont, New York, southeastern Ontario, Ohio (very local), Michigan and Wisconsin. Its thinnish, radical leaves are usually serrate and not fleshy; the inflorescence is a panicle made up of secund branches; the pedicels are very rarely up to 1 cm. long; the involucre is 3–5 mm. high; disk-florets 4–8. For the most part occupying very different areas, the two species meet at the borders of their ranges and there they often cross, just as do most other species of the genus when they commingle: the very distinct *S. caesia* crossing with such wholly different species as *S. flexicaulis, bicolor, rugosa* and *canadensis;* but the most striking case is *S. asperula* Desf., an almost inevitable hybrid wherever the ubiquitous *S. rugosa* of fresh soils closely approaches *S. sempervirens* of the salt-marshes and seashore. In brief, although the boreal *S. chrysolepis* will cross with the more austral *S. uniligulata,* the two species are, in the main, completely distinct.

Returning to the geographic varieties of *Solidago uliginosa,* I recognize the following:

a. Relatively stout, 0.6–1.5 m. high; cauline leaves 20–40, the upper ones oblong-lanceolate, the lower ones ovate-lanceolate to -oblong and 3–8 cm. broad; panicle elongate-pyramidal to ellipsoid, 1–4.5 dm. long and 0.3–2.5 dm. thick . . . . *S. uliginosa,* var. *uliginosa.*

a. Slender, 2–9 dm. high; cauline leaves 5–20 (rarely –30), linear to lanceolate, the lower ones narrowly lanceolate to oblanceolate and 0.7–3 cm. broad . . . *b.*

b. Panicle elongate-pyramidal to cylindric-ellipsoid, commonly 1-sided, 0.2–2.5 dm. long, 1–10 cm. thick.

Branches of panicle and pedicels conspicuously hirtellous; plants of acid bogs and swamps. . . . . Var. *linoides.*

Branches of panicle and pedicels glabrous or glabrate and glutinous; chiefly of marly bogs and swamps. . . . . . Var. *levipes.*

b. Panicles corymbiform to rhomboid or broadly pyramidal, 2.5–15 cm. broad, usually dense. . . . . Var. *terrae-novae.*

S. uliginosa Nutt., var. uliginosa (Nutt.) Cronquist in Rhodora, xlix. 73 (1947). *S. uliginosa* Nutt. in Journ. Acad. Nat. Sci. Philad. vii. 101 (1834). *S. neglecta* Torr. & Gray, Fl. N. Am. ii. 213 (1842); Gray, Syn. Fl. N. Am. i^2. 154 (1884). *S. uniligulata* (DC.) Porter, var. *neglecta* (Torr. & Gray) Fernald in Rhodora, xxiii. 292 (1922).—Acid swamps, meadows and moist to dryish thickets, Delaware and Maryland and upland of North Carolina (rare), north to Nova Scotia, southeastern and southern Maine, southern New Hampshire, southern Vermont, New York, Ohio, Lambton County, Ontario, southern Michigan and southern Wisconsin. Late July—early October.

The hybrid of *S. chrysolepis* and *S. uliginosa*, var. *uliginosa* (*S. neglecta*) is

× **S. Farwellii,** nom. nov. *S. neglecta*, var. *simulans* Farwell in Papers Mich. Acad. Sci. i. 100 (1923), not *S. simulans* Fernald in Rhodora, xxxviii. 305, plate 419, figs. 1–5 (1936).

Var. **linoides** (Torr. & Gray), comb. nov. ? *Bigelovia uniligulata* DC. Prodr. v. 329 (1836). *Chrysocoma uniligulata* (DC.) Nutt. in Trans. Am. Phil. Soc. n. s. vii. 325 (1840). *S. linoides* Torr. & Gray, Fl. N. Am. ii. 216 (1842) as to plant described from New Jersey and Massachusetts, not as to Solander specimen cited, Torrey & Gray also citing under *S. linoides* "Solidago uliginosa, partly, *Nutt.!*". *S. neglecta* Torr. & Gray, var. *linoides* (Torr. & Gray) Gray, Syn. Fl. N. Am. i². 154 (1884), Gray again noting it as "*S. uliginosa*, Nutt. . . . , in part, but not of his own herb. nor descr." *S. neglecta*, var. *uniligulata* (DC.) BSP. Prelim. Cat. N. Y. Pl. 26 (1888). *S. uniligulata* (DC.) Porter in Mem. Torr. Bot. Cl. v. 320 (1894). *S. humilis* Pursh, var. *peracuta* Fernald in Rhodora, xvii. 6 (1915). *S. uliginosa*, var. *peracuta* (Fernald) Friesner in Butl. Univ. Bot. Studies, iii. no. 1: 55 (1933).—Acid bogs and peats, New Jersey and eastern Pennsylvania, north to Exploits and Humber Valleys, Newfoundland, Magdalen Islands, southern New Brunswick, central Maine, New Hampshire, Vermont, New York, southern Ontario and southern Michigan. Type from Wading River, New Jersey, September, 1833, *Asa Gray* in Gray Herb.

Although Torrey & Gray, Gray (through five editions of the Manual), Porter, House and others, who really knew the two extremes, considered *S. uniligulata* or *S. linoides* a distinct species, altogether too many transitions occur between it and typical *S. uliginosa* in the southern half of their ranges. From Newfoundland to central Maine, where typical *S. uliginosa* is not found, there is no such trouble, but southward the sorting sometimes becomes a bit artificial. The type and only collection of *S. humilis*, var. *peracuta* is a very young specimen but its thin and serrate lower leaves are those of *S. uliginosa*, var. *linoides* (although in the young plant the cauline ones are still overlapping), the inflorescence is too young for definite pronouncement, but its short and very hispid pedicels and branches and the involucre are those of *S. uliginosa*, var. *linoides*.

Var. **levipes** (Fernald), comb. nov. *S. uniligulata*, var. *levipes* Fernald in Rhodora, xvii. 7 (1915). Marly bogs, swamps and shores, New York and southern Ontario.

House, Annot. List N. Y. State, 691 (1924), states that var. *levipes* "seems to include nearly all of the inland specimens of this species." Wiegand & Eames, Fl. Cayuga Lake Basin, 400 (1926) cite *S. uniligulata* (in their area the var. *levipes*) as "usually in marly soil." The plants have the narrow and serrate leaves as in *S. uliginosa*, var. *linoides* but the inflorescence is essentially glabrous as in *S. chrysolepis*. It may, when carefully checked, prove to be a persistent hybrid of the two.

Var. **terrae-novae** (Torr. & Gray), comb. nov. *S. Terrae-Novae* Torr. & Gray, Fl. N. Am. ii. 206 (1842); Gray, Syn. Fl. N. Am. i². 154 (1884). *S. uniligulata*, var. *terrae-novae* (Torr. & Gray) Fernald in Rhodora, xxiii. 292 (1922).—Peaty barrens, tundra, acid rock and damp thickets, southernmost Newfoundland, north to Trinity Bay and Bay St. George; Magdalen Islands; Cape Breton, Nova Scotia, to southern New Hampshire.

Although in its most typical development var. *terrae-novae* is very pronounced, it passes into var. *linoides;* and, although treating it as a distinct species, Asa Gray, in preparing the Synoptical Flora, marked the type of *S. terrae-novae* from *La Pylaie* as a variety of *S. neglecta* and then crossed out the new identification. Many later collections show that his impulse was the right one. The variety has the slender habit and reduction of leaves of var. *linoides,* but a broad panicle suggesting most extreme inflorescences of var. *uliginosa.*

The Genus Crepis.—Among large plant genera, *Crepis* is almost unique for the amount of genetic, cytological, and taxonomic study it has received, principally at the hands of Babcock and his associates. One hundred and thirteen of its 196 species have been cultivated and investigated cytologically and 55 of them have been employed in interspecific hybridization. The genus was originally selected as suitable for genetic experiment because of the low chromosome number of some of its species. It was soon discovered that taxonomic revision was necessary before new experimental evidence could be satisfactorily correlated, and Babcock was thus led to become a practising taxonomist. How ably he has played this role will be clear to any reader of the present publication.[1]

Since taxonomy is or should be one of the major synthesizing phases of biology, it is fitting that the phylogenetic conclusions from the author's three decades of study of the genus should be expressed in taxonomic form. This is truly a "biosystematic" treatment inasmuch as evidence from hybridization,

[1] Babcock, Ernest Brown. The Genus Crepis. Univ. Calif. Publ. Bot. vol. 21, pp. xii + 1–198, frontispiece, plate 1, figures 1–11, tables 1–12. 1947; vol. 22, pp. x + 199–1030, plates 2–36, figures 12–305, tables 13–19. 1947. Part I, paper, $3.50 cloth $4.00; part II, paper $10.00, cloth $12.00; both parts, paper $13.50, cloth $15.00.

chromosome pairing, and chromosome number and morphology has weighed heavily in preparation of the resultant classification. Taxonomists who have learned to look with a somewhat wary eye at products of the "newer taxonomy" will be relieved to learn that the systematic treatment "rests primarily on comparative morphology." Further, the author warns that in his opinion "crossability alone is of dubious value as an index to relationship," and that "the phylogenetic significance of chromosome number, size, and shape can be interpreted only in relation to or with aid of other criteria."

Physically, the paper consists of two volumes. The first contains a synopsis of the investigations of *Crepis* together with their taxonomically significant results, a discussion of the taxonomic concepts employed, an evaluation of the criteria—morphological, cytological, and genetic—regarded as important in indicating evolutionary relationship, and a carefully reasoned and plausibly argued reconstruction of the origin and development of the genus. The second volume is a handsomely illustrated systematic treatment with abundant distribution maps, full keys and descriptions, citations of more than 5,000 specimens in 85 herbaria, a list of exsiccatae, and photographs of types and other critical specimens. For each species is provided a beautifully prepared series of outline drawings showing habit, structural details of various organs, and, wherever possible, an ideograph of the somatic chromosomes. In place of the classical tri-sectional division of the genus, 27 more natural sections are recognized. Because taxonomic accounts are notoriously unexciting, most readers will probably glance at the second volume of "*Crepis*" with awed admiration, and then turn hastily to the more nearly narrative first part. They should not forget, however, that the supporting data are housed in volume II.

The work is notable for the generous acknowledgment of the assistance given by numerous contributors. Both volumes are dedicated to the late Harvey Monroe Hall, whose contagious championing of the "phylogenetic viewpoint" is credited with inspiring the genetic and cytogenetic attack on *Crepis*. An interesting contrast is provided by comparing the present monograph with Hall & Clements' "The Phylogenetic Method in Taxonomy"[2] Objectives of the two papers are ostensibly the same, but this one has profited by thirty years of careful investigation and the author's modesty, and is replete with the factual documentation so conspicuously lacking in its predecessor.

The reconstruction of the behavior of *Crepis* in time and space is impressive. Species with five or six pairs of chromosomes are more primitive than those with three or four. The bulk of the American species, with 11 pairs, are believed to have originated as a consequence of the crossing of Eurasian species with lower numbers; polyploidy and apomixis have been superimposed upon the original hybridizations. It is concluded that *Crepis*, a truly monophyletic genus, arose in the Altai-Tien Shan area of Central Asia by late Oligocene time, and spread outward along four major migrations routes. The well established Beringian is the only land-bridge postulated, and the theory of continental drift is not utilized. Speciation is thought to have occurred primarily as a result of gene mutations and alterations in chromosomal structure, with genetic or other isolating mechanisms permitting the development of new entities. Hybridization, polyploidy, and apomixis are assigned a subordinate evolutionary role. The careful selection of corroborative evidence from historical geology, paleobotany, and other fields and the scholarly imbrication of authority upon authority is a masterpiece of logical reasoning. It is to be hoped, however, that other monographers will not too hastily conclude that the history of the groups which interest them parallels that of *Crepis*, without taking into consideration the wealth of data which has gone into the formulation of the present picture. These data may be valid only for *Crepis*.

This work will take an honorable place among the first rank of taxonomic monographs. Because its approach to systematics is so broadly based, it

[2] Carnegie Institution of Washington Publication No. 326.

challenges taxonomists to search beyond their classical techniques for additional phylogenetic evidence. Taxonomy as a whole has profited greatly by Professor Babcock's labors. He has demonstrated simultaneously how much cytology and genetics have to offer to systematics, and the manner in which data from these fields can be made wholly palatable to taxonomists.—LINCOLN CONSTANCE.

CREPIS NANA NOT YET KNOWN FROM GASPÉ.—In Babcock's great study of The Genus Crepis, pt. ii. 542—Univ. Calif. Pub. Bot. xx. (1947) an eastern botanist reads with keen interest the statement that this tiny species with discontinuous range grows in Gaspé: "**Quebec**: Gaspé Pen. *fide* Fernald (Mem. Gray Herb. Harv. Univ. 2: 252, 1925". The present writer, surprised by the statement, checked the reference which occurs in the paragraph quoted below:

> Another region with which the Shickshocks and the Long Range occasionally share otherwise endemic species or isolated colonies of western plants is the Torngat Mountain area of northern Labrador. Thus, *Arenaria cylindrocarpa* Fernald (map 13) occurs on the Long Range, the Shickshocks, the Torngats and, more than 2000 miles (3200 km.) away, on the Rocky Mountains of Alberta. The plants of the Torngats, furthermore, show their own distinctive identities with cordilleran types. Thus, the sedge, *Carex filifolia* Nutt., is very characteristic of high plains and dry ridges from Yukon to Oregon, New Mexico and Saskatchewan but in the East it is unknown except upon the Torngats. Again, the little composite, *Crepis nana* Richardson (map 14), although originally described from an extreme northern station, at the head of Coppermine River (north of Great Slave Lake) and now known north of the Arctic Circle, is more generally known on the high mountains of the Cascade-Sierra Nevada axis to southern California and along the Rocky Mountains to Colorado. Eastward its only known stations are on the Torngats.

Map 14, on p. 253, shows a dot for the Torngats but none in the East south of there, although subsequently *Crepis nana* has been found near the Straits of Belle Isle in northern Newfoundland. It seems important to call attention to the error of citing the species from the Gaspé Peninsula, since such published statements, especially by famously cautious students, are rarely checked. Now *Crepis nana* must be found on limestone barrens of Gaspé!—M. L. FERNALD.

A WHITE-FLOWERED DESMODIUM FROM VIRGINIA.—In Shenandoah County, Virginia about one mile south of Elizabeth Furnace Forest Camp a white-flowered *Desmodium* has been blooming, in

season, for over six years. This *Desmodium* resembles most *Desmodium nudiflorum* (L.) DC. Its habitat, dry woods, is similar and, in this particular spot, the two grow side by side. The leaves are clustered at the top of a sterile stem, the flowers are borne on an ascending, leafless stalk about 60 cm. or less in height. The bracts are inconspicuous and deciduous. In contrast with *D. nudiflorum*, the flowers, as previously mentioned, are white, *D. nudiflorum*, f. *Dudleyi* (House) Fassett. Instead of the deeper purple color found at the base of the standard petal in *D. nudiflorum*, this white-flowered one has the base of the standard petal marked with deep green.—LENA ARTZ, Waterlick, Virginia.

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ERRATA

Page 98, line 17; *for* III *read* II, I.
Page 99, last line; *for* Epling *read* (Kearney) Small.
Page 164, last line; for *1949* read *1947*.
Page 185, line 35; *for* glangular *read* glandular.
Page 186, line 8; *for* fresh-savannas *read* fresh savannas.
Page 241, line 40; *for* HEBERRACHIS *read* HEBERHACHIS.
Page 259, line 11; *for* Walt. *read* (Walt.) Rydb.
Page 259, line 17; *for* L. *read* (L.) K. C. Gmel.
Page 260, line 38; *after* Holm *omit* period.
Page 266, line 35; *for* Forma *read* Var.
Page 268, line 29; *for* Monroe *read* Munro.

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